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Who's Afraid of a Globalized World? Foreign Direct Investments, Local Knowledge and Allocation of Talents*

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Abstract

We study the distributional effects of globalization within a model of heterogeneous agents where both managerial talent and knowledge of the local economic environment are required in order to become a successful entrepreneur. Agents willing to set up a firm abroad incur a learning cost that depends on how different the foreign and domestic entrepreneurial environments are. In this context, we show that globalization fosters FDI and raises wages, output and productivity. However, not everybody wins. The steady state relationship between globalization and income is U-shaped: high- and low-income agents are better off in a globalized world, while middle-income agents (domestic entrepreneurs) are worse off. Thus, consistently with recent empirical evidence, the model predicts globalization to increase inequality at the top of the income distribution while decreasing it at the bottom.

JEL Classification: E61-F23-F41.

Keywords: Distributional Effects of Globalization, Heterogeneous Agents, Income Inequality, Endogenous TFP, Multinational Firms.

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1 Introduction

Who opposes globalization? Who favors it? It is well-known that in a Heckscher-Ohlin context the process of globalization produces winners and losers as a consequence of the changes in the relative abundance of factors. Despite its obvious relevance, this issue has been so far hardly analyzed in the context of intraindustry trade models *à la* Melitz (2003), where gains from trade do not arise from international differences in factor endowments, but from consumers' love for variety and from the ability of the entrepreneurs to overcome the barriers that distance generates. So far this literature has focused on models with "heterogeneous firms" and "homogeneous agents".

This paper is an attempt to analyze the distributional effects of globalization within a Melitz-type model with heterogeneous *agents*. Our main finding is that the effect of globalization on the individuals' well-being is non-monotonic. A higher degree of inter-connectedness among countries has a U-shaped effect on the income distribution, improving the position of both those at the top and the bottom of the distribution and harming those in the middle. This prediction is consistent with recent empirical evidence showing that since the 1990's both in the U.K. and the U.S. inequality went up in the upper tail of the distribution and decreased in the lower tail (Autor et al., 2005; Autor et al., 2006 and Machin and Van Reenen, 2007).

We obtain this result in a model of Foreign Direct Investments (FDI), one of the most prominent (and debated) features of globalization. FDI grew dramatically over the last decades far outpacing the growth of trade and income.¹ Another salient feature of FDI is that they take place mostly between developed countries, i.e. between countries that are similar in terms of natural endowments and relative supply of inputs.² We provide additional empirical evidence in line with this fact, documenting that bilateral FDI are also higher between countries that have more similar *economic environments*.³

Consistently, we propose a model in which *both* managerial talent and *knowledge of the local economic environment* are required in order to set up a firm and earn positive profits. The main trade-off that arises in the model depends on how individuals with different abilities are allocated to the different types of jobs available in the economy. To be more specific, a first key feature of the model is that agents with different levels of managerial ability are allowed to select their occupation and choose whether to become entrepreneurs or workers. Those who become

¹Whereas world-wide real GDP increased at a rate of 2.5 percent per year between 1985 and 1999 and world-wide exports by 5.6 percent, world-wide real inflows of FDI increased by 17.7 percent.

²For the period 1970-2000, Barba Navaretti and Venables (2004) report that more than 90% of outward flows of FDI originates from advanced countries. Over the same period, the share of the world FDI inflows directed to developed countries ranges between 58 and 78 percent.

³Broadly speaking, one may think of the entrepreneurial environment as representing the complex set of circumstances, generally different across countries, entrepreneurs need to deal with: identification of consumers' tastes, communication with costumers, relationship with the bureaucracy, comprehension of the legal environment, purchase of inputs, relationship with other firms, setup of the production process (hiring and firing procedures, salary structure, technology choices,...). This is very well explained in the statement that used to appear on Unilever's website (cite taken from Barba Navaretti and Venables, 2004):

"Many of our brands have international appeal, while others are leaders in local markets. It is our *keen understanding of cultures and markets* that allows us to anticipate consumers' needs and to provide them with what they need, when they need it." (Unilever, emphasis added)

entrepreneurs may engage in FDI and set up a firm abroad. However, in order to become a successful entrepreneur in a given country, managerial ability is not sufficient: some *knowledge* of the local economic environment is also required.

A second key feature of the model is that agents are assumed to know more about the domestic economic environment (e.g. domestic consumers' tastes) than about the foreign environment. Domestic agents have to *learn* how the foreign economic environment works in order to profitably set up a firm abroad. Thus, both managerial ability *and* nationality contribute to determine career choices. The idea is that a certain level of managerial talent, though allowing agents to profitably produce within the domestic economic environment, may be of little help when setting up a firm abroad. The more different the foreign and the domestic economic environments, the more difficult to succeed in the foreign market. This *distance* between entrepreneurial environments is the only explicit barrier to capital movements that matters in the model. It may be overcome only at the cost of learning how the foreign environment works. Of course, in equilibrium, only the most talented entrepreneurs, who run – in line with the empirical evidence – the largest and most productive firms, have incentives to pay the learning cost and produce abroad.

The model endogenously determines the allocation of talents between (domestic and international) entrepreneurial activity and salaried work. It follows that FDI, Total Factor Productivity (TFP), GDP and wages depend on how efficiently talents are allocated. Talent allocation, in turn, depends on how hard it is to learn about the foreign entrepreneurial environment. A lower distance between entrepreneurial environments reduces the learning cost and raises the inflow of foreign-owned firms into the domestic market. This increases the domestic wage and makes the entrepreneurial activity less profitable, driving a fraction of low-ability domestic entrepreneurs out of the market. This general equilibrium effect improves the allocation of talents and increases both TFP and GDP.⁴ On the contrary, a larger distance between entrepreneurial environments protects low-ability entrepreneurs from foreign competitors and reduces output, wages and TFP. Thus, globalization fosters *aggregate* efficiency.

Still, not everybody wins when the degree of globalization increases. The following example – where for the sake of clarity we consider two polar cases – clearly illustrates the intuition:

Case 1: *Globalized Universe.* In this world the economic environment is identical across locations and only talent matters: learning costs are zero. The most talented individuals become entrepreneurs and there exists a critical level of talent that makes the marginal individual indifferent between being an entrepreneur or a worker. An individual whose entrepreneurial talent lies just below that critical level would choose to be an entrepreneur only if wages were lower, both because profits would be higher and because the worker option would be less attractive.

Case 2: *National Universe.* In this world the entrepreneurial environments are different across countries and learning how the foreign environment works is infinitely costly. Thus, FDI

⁴This is consistent with a growing body of empirical evidence pointing to the existence of a positive relationship between FDI and both wages and productivity. Baldwin, Braconier and Forslid (1999) show that FDI positively affect wages using industry-level data for seven OECD countries. Keller and Yeaple (2003) provide firm-level evidence from the US showing that FDI spillovers account for about 14% of productivity growth in U.S. firms between 1987 and 1996. Javorcik (2004) provides similar evidence for Lithuania. See Lipsey (2002) for a review of the micro evidence on the home and host country effects of FDI.

are *de facto* ruled out and only local firms demand labor in the local labor market. Consequently, wages are lower compared to the *Globalized Universe*.

Consider now three individuals. In decreasing order of managerial ability: Ms Capitalistson, Ms Petitbourgeoison and Ms Proletariatson.

The first one (Ms. Capitalistson) has a large degree of entrepreneurial talent. In the *Globalized Universe* she invests both at home and abroad, while in the *National Universe* she is a domestic entrepreneur. On the one hand, she likes the *National Universe* because wages are lower and this implies larger domestic profits. On the other hand, she also likes the *Globalized Universe* because of the larger investment possibilities. It turns out that if her talent is large enough she typically prefers the *Globalized Universe*.

The second one (Ms. Petitbourgeoison) has a lower degree of entrepreneurial ability. Her talent level is such that, in the *Globalized Universe*, she (slightly) prefers to be a worker. Therefore, in the *National Universe* where wages are lower, she chooses to become entrepreneur. Thus, globalization expels her from the entrepreneurial activity and makes her strictly worse off.⁵ The intuition is simple: from an entrepreneur's point of view, globalization is beneficial insofar it allows to gain access to larger markets. Low-ability entrepreneurs lose from globalization because tougher competition drives them out of the market and prevents them from reaping the benefits of accessing to larger markets.

Finally, Ms. Proletariatson has even lower entrepreneurial abilities. So low that she chooses to be a worker independently of the world (*Globalized* or *National*) where she happens to live. It follows that she prefers to live in the *Globalized Universe*, where wages are higher.

Thus, in a national world the distance between entrepreneurial environments shelter inefficient firms. Even in the absence of any pro-competitive effects of FDI working through lower prices,⁶ the general equilibrium effect through wages is sufficient to expel mediocre entrepreneurs as the difference between economic environments becomes smaller. As a result, globalization increases inequality in the upper tail of the distribution and decreases it in the lower tail of the distribution.

As the model is based on the idea that globalization reduces the distance between economic environments and therefore leads to higher FDI, we test this relationship against the data. We proxy the distance between economic environments exploiting measures of Product Market Regulation. We also interpret the difference between languages as a qualitative proxy of the distance between economic environments. Using both a traditional log gravity model and a Poisson Pseudo-Maximum-Likelihood model (Santos Silva and Tenreyro, 2006), we find that, controlling for the *levels* of regulation, GDPs and populations in both countries, host and source countries fixed effects, time effects, and a set of geographical variables, a higher distance between

⁵Recall that Ms. Petitbourgeoison is almost indifferent between career choices in the *Globalized Universe* and is an entrepreneur in the *National Universe*. Lower wages imply that entrepreneurial profits are larger in a *National world*, so she must be better off in such a world.

⁶The competition effect is present in almost all the standard IO-based FDI models, since Horstmann and Markusen (1992). In our model product market competition does *not* increase in the domestic country as a consequence of foreign competition. We rule this effect out by assuming monopolistic competition and Dixit-Stiglitz preferences. See Melitz and Ottaviano (2008) for a model of trade with firm heterogeneity and endogenous mark-ups.

economic environments negatively affects the size of bilateral FDI stocks.

This paper is obviously related to the recent trade literature that, since Melitz (2003), develops dynamic industry models with heterogeneous firms, in which only the most efficient firms engage in cross-border activities and where more openness forces the least productive firms out of the market. In our paper, exactly as in Melitz (2003), only the general equilibrium effect, via higher labor demand and higher wages, generates this selection effect. The key difference with Melitz (2003) is that in his paper heterogeneity is cast at the firm level: consumers are homogeneous and there is no endogenous sorting of agents into jobs. In this paper, instead, firms' heterogeneity stems from the heterogeneity (in managerial talent) of the agents who are allowed to make career choices. These features of the model allow to emphasize the (endogenous) mechanism by which exposure to foreign competition improves the allocation of talents and, most importantly, to discuss the distributional implications of globalization.

Another strand of literature related to this paper is the one that analyzes the distributional effects of decreasing trading costs in a Heckscher-Ohlin context. To the best of our knowledge this is the first paper that uncovers the distributional effects of globalization in the context of intraindustry trade models.⁷ In a recent working paper Helpman et al. (2009) also study the distributional consequences of international trade in a model with heterogeneous firms and workers in which labor markets are imperfect. They assume that workers' abilities are complements in the production technology and that the strength of production complementarities increases with firm productivity. Thus, more productive firms are larger and pay higher wages. In their context, the distributional effects of globalization in developed economies are akin to those derivable in Heckscher-Ohlin models: the most efficient workers benefit from globalization because their firms (the most efficient ones) do, while the least skilled workers suffer because their firms (the least efficient ones) also suffer. One key difference between our approach and their model is that we allow for endogenous career choices and learning of the foreign environment. Thus, in our context the welfare effects of globalization are U-shaped. The individuals at the low-end of the income distribution improve their position because the demand for their labor services is larger when foreign firms have access to the local market.

We finally relate to the extensive (theoretical and empirical) literature that studies the driving factors of FDI.⁸ Their key findings may be quickly summarized as follows. First, a host of institutional, technological and market factors affect firms' decision to set up production facilities in a foreign market. Obvious examples are trade barriers, (firm- vs. plant-level) economies of scale, and market size. Second, larger cross-country factor cost differentials, generated either by differences in productivity or in the relative supply of inputs, are typically associated to larger FDI.⁹ Third, and more importantly for this paper, *larger* cross-country differences along some well identified dimensions, negatively affect FDI. For instance, Markusen and Maskus (2002) show that the similarity between host and home factor endowments is one of the main factors driving the location of foreign subsidiaries (together with the size of the host market). Focusing

⁷A previous version of this paper is Pica and Rodríguez Mora (2005).

⁸See among others Horst (1972), Deardorff, (1998), Ekholm (1998), Lipsey (2001), Razin et al. (2003), Shatz (2003), and Fumagalli (2003).

⁹Vertical FDI typically exploit factor prices differences. Using US data, Brainard (1993) and Markusen and Maskus (2001) get some support for the relevance of factor market considerations as determinants of FDI.

on the third set of determinants of FDI, (i) we provide an explanation of why smaller cross-country differences (along some *non obvious* dimensions) foster bilateral FDI and (ii) produce new empirical evidence in support of this finding.¹⁰

The rest of the paper is organized as follows. Section 2 presents empirical evidence on the effects of the distance between economic environments on FDI. Section 3 describes the model economy. Section 4 solves for the closed economy benchmark while section 5 discusses the framework where entrepreneurs are allowed to set up firms abroad. Section 6 analyzes the distributional effects of globalization and section 7 concludes.

2 Differences between Economic Environments and FDI

The model outlined in section 3 is based on the idea that a lower distance between economic environments leads to higher bilateral FDI. This section provides empirical support to this idea. Specifically, it shows evidence of a negative relationship between bilateral FDI stocks and variables that proxy for the cross-country distance between entrepreneurial environments.

A crucial problem is to find reasonable proxies for the “distance between entrepreneurial environments”. A first qualitative proxy may be the difference between languages. Countries sharing the same language are likely to be more homogeneous than countries with different languages. The cultural environment is arguably more similar and both mutual understanding and exchange of ideas are easier when the same language is spoken. The interplay between those factors very likely contributes to enhance the homogeneity of the economic environments as well. Even though this variable has already been considered in previous empirical work on gravity equations, it is interesting to check whether the positive *ceteris paribus* impact of common language on FDI survives after controlling for the levels of regulation in each country and for the cross-country distance between regulations.

In fact, our second proxy for the distance between entrepreneurial environments is the cross-country distance between regulations. The idea is that national regulations contribute to shape the economic environment, because they typically prescribe to follow particular procedures (e.g. business start-up procedures, administrative rules, safety and health regulations, food regulations). The more the institutional settings (or any kind of law that imposes to comply with some procedures) are different, the more costly the adaptation process to the new environment and the smaller the incentives to actually run businesses abroad. Thus, rough as it may be, this measure captures, at least partly, the difference between entrepreneurial environments and has the advantage of being easily observable.

To conduct the empirical analysis we rely on data on bilateral FDI, on nationwide regulation indexes and on country characteristics, including language, that we describe in the next section.

¹⁰The reason why we do not focus on the first two sets of determinants of FDI is twofold. First, the channels through which they shape *Ricardian* (and “*Heckscher-Ohlinean*”) FDI are well understood. Second, the overwhelming proportion of FDI is horizontal rather than vertical.

2.1 The Data

FDI figures are drawn from the *OECD International Direct Investment Statistics* that provide annual data on international direct investment stocks for a number of OECD countries by geographical distribution, i.e. to and from partner countries and regions from 1981 to 2002 in current dollars. Table 1 presents descriptive statistics and shows that the data contain 5371 non-missing observations on bilateral FDI stocks, 127 of which are negative (and have been therefore dropped) and 246 are zero. A notorious problem in the literature that estimates traditional log-linear gravity models is that the log eliminates all zeros. For this reason we will show results both from the traditional log-linear specification and from the Poisson Pseudo-Maximum-Likelihood model recently suggested by Santos Silva and Tenreyro (2006), described in section 2.2, that allows to easily incorporate zero stocks.

Data on GDP per capita and population are taken from the Penn World Tables version 6.2 (Heston, Summers and Aten, 2006).¹¹ All geographical variables are drawn from Frankel, Stein and Wei (1995) and Frankel and Wei (1998).

Variables measuring the level of regulation implemented in different countries are taken from the OECD (Nicoletti et al., 2000 and Conway et al., 2005) and from the World Bank *Doing Business 2004* Dataset (available at <http://www.doingbusiness.org/>). The OECD dataset consists of indexes measuring the extent of Product and Labor Market Regulation in a number of OECD countries during the 90's. As to Product Market Regulation, the OECD provides both an overall index and a set of sub-indexes measuring the extent of regulation along specific dimensions. Of particular interest for our purposes are the indexes capturing mostly administrative burdens and red tape costs (*Administrative regulations* and *Barriers to entrepreneurship*), i.e. all those bureaucratic procedures whose *knowledge* is an essential prerequisite in order to be able to set up a firm in a (foreign) country. The Labor Market Regulation index measures the strictness of employment protection legislation.

The World Bank, on the other side, provides a comprehensive database, called *Doing Business*, collecting information on business regulations and their enforcement, especially on small- and medium-size domestic firms, for 145 countries. The dataset we exploit refers to January 2004. The available indicators cover seven major areas, namely Starting a Business, Hiring and Firing, Registering Property, Getting Credit, Protecting Investors, Enforcing Contracts, and Closing a Business. For each of them different indexes are provided. Some indicators (like *Number of procedures to register a business* or *Index of employment law rigidity*) aim at measuring the effect of *actual* regulation on businesses, while others (such as *Time and cost to register a business*, *enforce a contract*, or *go through bankruptcy*) are measures of regulatory *outcomes*.

In the empirical exercise we will interpret the linguistic tie dummy, that captures mostly cultural proximity and ease of communications, as a qualitative measure of similarity between economic environments, and the absolute value of the difference between regulation indexes as an additional measure of proximity, more strictly related to the entrepreneurial environment.

¹¹We use the variables CGDP and POP. The variable CGDP is the real gross domestic product per capita in International US\$ at current prices. To transform it into current dollars (as the FDI figures) we multiply it by the PPP index obtaining per capita GDP in national currency, and then divide it by the exchange rate. Both the PPP index and the exchange rate are taken from the Penn Tables.

Of course, these measures of regulation are far from perfect. Ideally, one would like to have (time-varying) information on whether regulations are *qualitatively* different rather than just *quantitatively* different as, for example, two countries that require the same number of procedures to start up a business may demand to comply with very different tasks. However, since qualitative differences in regulations plausibly generate quantitative differences as well, these data should allow to capture, at least partially, the distance between entrepreneurial environments. One may still worry that biases arise if the distance between regulations proxies for factors that are not linked to the economic environment. For example, Latin countries may all tend to be more regulated than Anglo-Saxon countries for historical reasons. To deal with this, we add in the regression a set of area dummies, such as a “Latin country” dummy, a European Union dummy, a North American dummy and an Asian dummy.

We conduct the analysis on a final set of 24 OECD countries, listed in Table 2, for which we have data both on FDI stocks and regulation indexes. Table 3 shows the closest and farthest country pairs, by listing the country pairs in the top and bottom deciles of the average proximity distribution. Among the closest country pairs one finds not only the low-regulation Anglo-saxon countries, but also pairs of fairly regulated countries such as Portugal-Spain or Sweden-Germany. The farthest country pairs include, not surprisingly, the U.S. on the one side and the most regulated European countries, such as Italy, Greece, Portugal, Turkey and Poland, on the other side.

2.2 The Empirical Model

We first estimate the following standard log-linear gravity model:

$$\ln F_{ijt} = \alpha_i + \eta_j + \tau_t + X_{ijt}\beta + \delta \text{lang}_{ij} + \gamma |\text{reg}_i - \text{reg}_j| + \ln \varepsilon_{ijt} \quad (1)$$

where $\ln F_{ijt}$ is the (log of) the stock of FDI in year t from country j (the source) to country i (the host); α_i and η_j are host and source countries fixed effects; τ_t is a year effect; the matrix X_{ijt} includes variables, such as the (log of) the source and host countries GDPs per capita (in US dollars); the (log of the) source and host countries populations;¹² the (log of the) distance between the main cities of the two countries; dummies for country i and j sharing common land borders, for both countries belonging to the European Union; for both countries being located in North America; for both countries being located in Asia; for both countries being “Latin”. These geographical variables are meant to capture the proximity-concentration trade-off (Brainard, 1997).

Finally, the matrix X_{ijt} also includes an index of Product Market Regulation (Conway et al., 2005) to control for the *level* of regulation in both the host and the source country. As this measure varies over time, it allows to control for the level of regulation even if both host and source country fixed effects are included.¹³

¹²Latitude and longitude, as well as any other time-invariant characteristics of the host and source countries, are captured by the fixed effects α_i and η_j .

¹³Together with an EPL index provided by the OECD, this is the only time-varying measure of regulation. The remaining ones used in the paper are all time-invariant. Results are unchanged if controlling for the regulation level using the OECD EPL index.

Summing up, in all our (source and host country) fixed effects specifications, on top of the geographical variables listed above, we also control for the levels of regulation, GDPs per capita and populations in both countries. This makes us confident that we are correctly partialling out the effect of the regulation *levels* in both countries. Thus, the coefficient γ exclusively captures the effect on FDI of *regulation* proximity, as measured by the absolute value of the difference between regulation indexes, while the coefficient δ measures the impact of *cultural* proximity, as proxied by the dummy variable $lang_{ij}$ that takes the value of one if countries i and j share the same language.

Yet, the log-linear specification outlined in equation (1) may provide biased estimates if the variance of the *level* error term ε_{ijt} is a function of the covariates (such as for example the distance between countries), because the expected value of the logarithm of a random variable depends both on the mean and on higher moments of the distribution. Additionally, the above log-linear specification obliges to drop all country pairs with zero bilateral FDI.

To address these problems we also generate results from a non-linear model, the Poisson Pseudo-Maximum-Likelihood model (PPML henceforth), recently suggested by Santos Silva and Tenreyro (2006), that allows to get consistent estimates in the presence of heteroskedasticity and provides a very natural way to deal with zeros of the dependent variable. The PPML model specifies the conditional mean of the dependent variable as follows:

$$E[F_{ijt} | covariates] = \exp(\alpha_i + \eta_j + \tau_t + X_{ijt}\beta + \delta lang_{ij} + \gamma |reg_i - reg_j|) \quad (2)$$

Under the assumption that the conditional variance of F_{ijt} is proportional to its conditional mean, the coefficients of the above model can be estimated by solving the very same set of first order conditions used for Poisson MLE on count data (see Santos Silva and Tenreyro, 2006, and Head and Ries, 2008). Thus, equation (2) not only allows to get unbiased estimates in the case in which the variance of ε_{ijt} is a function of the covariates, but it also easily allows to incorporate zero FDI. The coefficients of the model in equation (2) are as easily interpretable as those of the log-linear model as they represent the percentage change in the dependent variable for a unit increase in the independent variable.

2.3 Results

Before turning to the estimates, let us provide a visual summary of the relationship between the distance in entrepreneurial environments and the stock of FDI.

The top left panel in Figure 1 displays the difference between country i and country j indexes of *Product Market Regulation* on the horizontal axis and a non-parametric prediction of the mean stock of FDI from country j to country i on the vertical axis. The graph shows that a smaller difference between regulations is associated with larger bilateral FDI. The top right panel in Figure 1 uses a different measure of regulation, the extent of *State Control over Business Enterprises*, on the horizontal axis. On the vertical axis, as before, the average stock of FDI. Again, a smaller difference between regulations tends to be associated with larger bilateral FDI. Finally, the bottom panels in Figure 1 consider *Barriers to entrepreneurship* and *Barriers to*

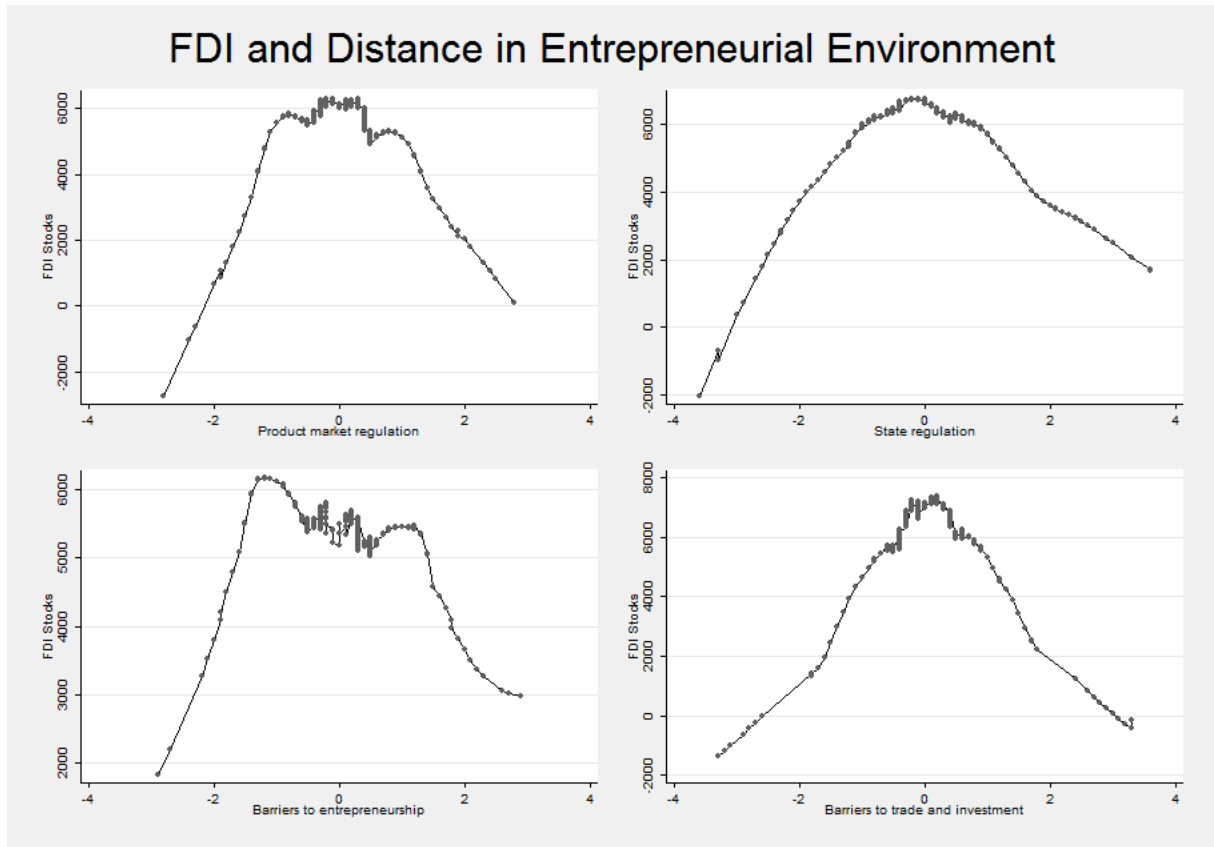


Figure 1: Vertical axis: non parametric prediction from a weighted local linear regression smoother with bandwidth 0.8 of the stock of FDI from country j to country i in years 1981-2002. Horizontal axis: regulatory distance between country i and j .

Trade and Investment. Also these graphs provide strong visual evidence of an inverse U-shaped relationship, centered around zero, between FDI and the distance between regulations.

The graphs in Figure 1 show that FDI do not flow from more regulated countries – where one would tend to think that the rewards from capital are low¹⁴– to less regulated economies, where one would tend to think that the rewards from capital are high. One explanation is that similarities between entrepreneurial environments foster FDI. An alternative explanation is that FDI take place mostly among (rich) non-regulated countries and regulation proximity is simply capturing the effect of the *level* of regulation. To discern between these two explanations, we produce results from multivariate models where we control for both the source and host country regulation *levels*. The formal analysis allows to rule out the alternative explanation and largely bears out the impression given by the figures: more similar regulations foster FDI.

Tables 4-7: results from the log-linear model

Table 4 presents the results from the estimation of equation (1) obtained exploiting the OECD regulation variables. Columns 1–9 report the results of nine alternative specifications that differ

¹⁴Unless, of course, regulated countries are poor and have a high marginal productivity of capital. In this case we should expect these countries to enjoy net FDI inflows. Our point is that, *in addition to this effect*, the flows seem to depend negatively on the regulatory *distance*.

only in the measure of regulation proximity included on the right hand side. In column 1 we use the overall index of Product Market Regulation and, from column 2 to column 9, the sub-indexes that focus on particular dimensions of product market regulation. All specifications include the linguistic tie dummy. The regulation *level* of the source and host country is controlled for by the time-varying regulation measure described above and by the source and host country fixed effects.

As our regulation variables are, in many cases, indexes with no natural scale, the magnitude of the coefficients would not be *per se* informative of the potential impact of regulation proximity on FDI. Therefore, all tables report the so-called “beta” coefficients. In linear regressions a beta coefficient is given by the product of the estimated coefficient and the standard deviation of its corresponding independent variable, divided by the standard deviation of the dependent variable. The regression coefficients are thus converted into units of sample standard deviations. This is equivalent to a regression where all variables are previously divided by their standard deviations.

The first row of table 4 reports the beta coefficients of the linguistic tie dummy. They are, as expected, positive and significant in all specifications and their magnitude is around 0.1. This means that, even after conditioning for all the relevant geographical and regulation variables, the stock of FDI from country i to country j is 10% larger if the two countries share the same language. The remaining rows of table 4 show the coefficients of the different indexes that measure the cross-country distances between regulations. Out of nine variables, seven turn out to be negative and significant at the conventional significance levels. The magnitude of the beta coefficients reported in table 4 suggests that regulation proximity has a non negligible impact on bilateral FDI stocks. For instance, a one standard deviation decline in the distance between *State Control*, i.e. a decline of 0.779, raises the stock of FDI by 0.048. In other words, if the distance in *State Control* regulations between France and Italy would move from the actual value of 1.3 to 0.5 (which is the actual distance between France and Austria), the stock of French FDI in Italy would increase on average by 4.8%

Tables 5-7 report the results from the estimation of equation (1) using the World Bank *Doing Business 2004* dataset. Again, the coefficient of the linguistic tie dummy is always positive and significant in all specifications, its value lying around 0.1. The coefficients of the World Bank indexes of regulation proximity are all negative (except one) and typically significantly different from zero. In particular, Table 5 shows that the coefficients of the variables proxying the difficulty of *Starting a Business* and the difficulty of *Hiring and Firing* are always negative and significant. The magnitude of the coefficients range from -0.03 of the *Cost of starting a business* to -0.088 of the *Difficulty of firing index*. Table 6 shows that a higher similarity in the regulation indexes concerning *Property Registration* also has a positive effect on FDI as both the *Number of procedures to register a property* and the *Number of days to register a property* enter negatively and significantly. The results on the effect of differences in the *Credit* system also display negative and significant coefficients, except for the *Cost to create collateral* which, though negative, is not significant. Finally, Table 7 shows that, while larger differences in the index of *Investor Protection* do not seem to matter, a larger distance in the procedures related to *Contract Enforcement* and to *Bankruptcy* procedures typically reduces the FDI.

Tables 8-11: results from the PPML model

Tables 8-11 present the results from the estimation of the PPML model in equation (2).¹⁵ The results show that the coefficient of the linguistic tie dummy is positive and significant in all specifications and in all tables. Moreover, the point estimates are typically larger than in the log-linear model and range between 10% and 15%. As to regulation proximity, in more than half of the specifications a lower distance in the entrepreneurial environments fosters FDI. The point estimates of the regulation proximity coefficients obtained with the PPML model are, again, typically larger than those obtained with the log-linear model, even though significance is not attained as frequently. On the whole, the results from the PPML model confirm the existence of a negative relationship between the indexes of regulation proximity and FDI.

The overall evidence suggests that, even after controlling for the levels of regulation in both countries, the distance between entrepreneurial environments has a bearing on FDI. In particular, we find that sharing the same language strongly matters and that regulations concerning *Product Markets*, *Labor Markets* (with some emphasis to be placed on firing restrictions), *Credit markets* and *Contract Enforcement* also play a prominent role in shaping bilateral FDI. Notice that these regulations have to do with the way entrepreneurs have to set up firms.

The next section presents a simple general equilibrium model, consistent with the above empirical evidence, that allows to study the distributional effects of globalization.

3 The Model

3.1 Demand and Production

There are two political entities (countries). In each of them agents have Dixit-Stiglitz preferences on the mass of products sold in their country. The demand for good j is:

$$x_j = Y p_j^{-\theta}$$

where Y stands for aggregate demand in the country, θ is the constant demand elasticity and p_j is the price of the good. We normalize the price of the “aggregate” good in each country to 1. All goods are consumed in the country where they are produced.¹⁶

Agents choose to be either entrepreneurs or workers. Workers receive the current wage of their country. Entrepreneurs set up firms (either at home or abroad) and face a monopolistic environment. All firms produce with constant returns to scale using only labor according to the production function $x_j = 4\rho L$. As explained in detail in section 3.2, the parameter ρ is stochastic, and agents are heterogeneous because the stochastic distribution of ρ is different across agents. Agents choose to be workers or entrepreneurs based on their knowledge of their distribution of ρ and, if entrepreneurs, they maximize their expected profits based upon this

¹⁵Also in this case we report the beta coefficients, obtained by estimating the model after having divided all variables by their standard deviations.

¹⁶See the working paper version (Pica and Rodríguez Mora, 2007) for an extension to a two-sector model, in a very similar setting, where a tradable good is produced by perfectly competitive firms. This allows multinational entrepreneurs to move foreign profits between countries. Results carry over to this extension.

knowledge. Assuming for the sake of simplicity that $\theta = 2$, the expected profits of entrepreneur i can be written as:

$$E(\pi) = 2E^i\left(\rho^{\frac{1}{2}}\right)Y^{\frac{1}{2}}(L^i)^{\frac{1}{2}} - wL^i$$

Optimally choosing the labor input L^i , the profits and labor demand of a single firm are respectively:

$$L^i = \left[E^i\left(\rho^{\frac{1}{2}}\right)\right]^2 \frac{Y}{w^2} \quad (3)$$

$$E^i[\pi] = \left[E^i\left(\rho^{\frac{1}{2}}\right)\right]^2 \frac{Y}{w} \quad (4)$$

Thus, in this setting, more “talented” agents (with higher expected ρ) on average set up more productive firms, hire more labor and earn higher profits.

3.2 Heterogeneity

We posit that agents are heterogeneous and differ in their ability to run businesses. Each agent faces a career choice. Agents choosing to become entrepreneurs set up a firm and produce a good that enters symmetrically in the utility function of consumers, generating the demand presented above. We assume that the “entrepreneurial ability” – the source of heterogeneity that determines the career choices – affects the productivity parameter ρ .

The idea is that in the day-by-day running of the firm, entrepreneurs face options and have to take decisions. In order to take the right decision two types of abilities are required. The first is managerial talent: more talented entrepreneurs are better able to solve problems and therefore make larger profits.¹⁷ The second type of ability is related to the entrepreneurial environment. Given a certain level of managerial talent, entrepreneurs with a deeper knowledge of the entrepreneurial environment are able to take better decisions. We think of the entrepreneurial environment as the set of factors that shape the economy primarily (though not uniquely) through its demand side. Examples are cultural factors, language, tastes, but also regulations or any other factor that does not directly affect technology. It is quite natural to think that the entrepreneurial environments differ across countries and that entrepreneurs that have “local” knowledge have an advantage vis-à-vis entrepreneurs who do not have this knowledge.

We model these two types of entrepreneurial abilities (talent and local knowledge) by assuming that, in each period t , agents need to take two actions, v_1 and v_2 . In each case the “right action” is a number in the real line:

$$r_t \in \mathbb{R} \quad ; \quad \mu_t \in \mathbb{R}$$

¹⁷By managerial talent we mean any individual characteristics that help being a successful entrepreneur. Talent is one, though not the only one. The ability of raising funds in a world with capital market imperfections is certainly another; in that case having wealthy parents would be akin to being more talented. In this paper we will consider managerial ability as exogenous and independent of the economic environment (the degree of competition, etc.). To see a model where this is not the case (i.e., where the contributions of talent and family background depend on equilibrium outcomes) see Hassler and Rodríguez Mora (2000). In any case, there is nothing offensive about having less managerial talent in our model.

Both r_t and μ_t are random variables.¹⁸ Managerial talent produces more accurate guesses on r_t , while knowledge of the local environment improves predictions on μ_t . We assume that the two decisions are independent (i.e, r_t and μ_t are independently distributed) and that each requires a different type of ability, which is a useful analytical simplification.¹⁹

Entrepreneurs do not know the precise value of r_t and μ_t and take decisions based on their available information. The further away their action from the “right action”, the lower the productivity of workers. That is, we take the productivity parameter ρ to be:

$$\rho = e^{-(r_t - v_1)^2} e^{-(\mu_t - v_2)^2}$$

and therefore

$$E\left(\rho^{\frac{1}{2}}\right) = E\left(e^{-\frac{1}{2}(r_t - v_1)^2}\right) \times E\left(e^{-\frac{1}{2}(\mu_t - v_2)^2}\right)$$

We now specify the information set available to producers.

Information on r_t . We assume that all producers know that r_t is a normally distributed random variable, with independent draws over time, that has a certain known mean (whose value is irrelevant) and variance V_r . In each period, before taking decisions, each entrepreneur receives an unbiased signal on r_t . The precision of the signal determines the ability of the entrepreneur.

If the precision of the signal received by the entrepreneur is τ , the variance of the posterior is $\frac{1}{\frac{1}{V_r} + \tau}$ and the precision is $P_{v_1} = \frac{1}{V_r} + \tau$. Given that the optimal action is to choose v_1 equal to the expectation of r_t , it is clear that:

$$E\left(e^{-\frac{1}{2}(r_t - v_1)^2}\right) = \sqrt{\frac{P_{v_1}}{1 + P_{v_1}}}$$

The first type of heterogeneity derives from the fact that agents receive signals on r_t with different levels of precision. More talented entrepreneurs receive signals with larger precision (lower variance) and they expect to take, on average, more correct decisions on r_t . Consequently, they expect to have on average more productive workers.

Information on μ_t . Agents do not receive signals on the value of μ_t . Rather, they know that it evolves according to the following process:

$$\mu_t = \mu + u_t$$

where μ is a *country-specific* constant and u_t is an individual-specific white noise disturbance with zero mean and variance equal to σ_u^2 . Agents take decisions before the realization of the shock u_t .

¹⁸It is irrelevant if the realizations of r_t and μ_t are different across agents or if they are common to all of them, the agents differing just in their information on them. The two cases are isomorphic.

¹⁹It is possible to specify a model where a single decision is taken at the cost of getting a much more involved learning process without gaining further insights.

We assume that domestic and foreign producers differ in their knowledge on μ and, thus, in their ability to guess any specific μ_t . Local producers *know* μ , and therefore they are only left with the residual uncertainty implied by the presence of the shock u_t . Foreigners, instead, do not know the exact value of μ and have to learn it by observing its realizations over time. The first time they produce in the foreign country they have a prior on the value of μ with a certain precision $\frac{P_0}{\sigma_u^2}$. We assume that whenever they have a positive level of production they observe an additional realization of μ_t , thus acquiring further information on the value of μ . It follows that the precision of the conditional distribution of μ grows linearly with the stretch of time the foreign entrepreneur has been exposed to the domestic environment.²⁰ The precision of the prior on μ after having observed $t - 1$ realizations of μ_t is:

$$P_t = \frac{P_0}{\sigma_u^2} + \frac{t-1}{\sigma_u^2} = \frac{P_0 + t - 1}{\sigma_u^2},$$

and the variance of the beliefs of such a foreign producer on μ_t is therefore:

$$\frac{1}{P_t} + \sigma_u^2 = \sigma_u^2 \times \left(\frac{1}{P_0 + t - 1} + 1 \right)$$

Thus a foreign entrepreneur faces a more difficult problem than a domestic one. The variance that she faces is equal to the variance that a local entrepreneur faces (σ_u^2) times a term $\left(\frac{1}{P_0 + t - 1} + 1 \right)$ which depends on the initial precision and on the length of the time period the entrepreneur has been operating abroad.²¹

The precision of the initial prior P_0 reflects the difference between entrepreneurial environments across the two countries. If there is no difference its value is infinite, and there is no difference between domestic and local entrepreneurs. The larger the difference, the less foreign entrepreneurs know about local conditions, and the smaller the precision of the prior of foreigners.

Independently of the distance between entrepreneurial environments, the precision of foreign entrepreneurs on μ grows unboundedly as they keep spending time in the local market. Eventually, they learn everything and the difference with local entrepreneurs becomes trivial.²²

It is now useful to introduce the following definitions:

Definition 1 *We define the “managerial talent” of an agent as:*

$$a = \frac{P_{v_1}}{1 + P_{v_1}}, \tag{5}$$

Its distribution across agents is determined by an exogenous CDF $F(a)$. Notice that a lies between 1 (for highly talented agents that always guess r_t right) and 0 (for agents who receive

²⁰We assume that talent does not affect either the initial knowledge or the speed of learning. Allowing for such interactions would complicate the algebra without adding further insights, as all is needed is that heterogeneity has two dimensions: talent and location.

²¹To be precise, the initial precision is $\frac{P_0}{\sigma_u^2}$, but we parametrize it by P_0 only as we later set σ_u^2 equal to 1.

²²Notice that there are no incentives either to enter into a market only to learn, or to produce a lot in order to learn faster. Learning is a byproduct of *being* in the market. It is not increasing with production, thus leaving no room to active learning strategies.

no signal on r_t or whose signal has a very high variance V_r).

Definition 2 Let $b(t)$ denote the disadvantage of a foreign entrepreneur producing for the t^{th} time in a foreign country:

$$b(t) = \frac{1 + \sigma_u^2}{1 + \sigma_u^2 \left(1 + \frac{1}{P_0 + t - 1}\right)} \quad (6)$$

Notice that $b(t) \in [0, 1]$, $\lim_{t \rightarrow \infty} b(t) = 1$ and $\forall t \lim_{P_0 \rightarrow \infty} b(t) = 1$.

The expected productivity of local entrepreneurs with talent a equals $\sqrt{\frac{a}{1 + \sigma_u^2}}$, and the average productivity of foreigners with talent a investing abroad for the t^{th} time is $\sqrt{\frac{ab(t)}{1 + \sigma_u^2}}$. Without loss of generality from now on we assume that σ_u^2 is equal to one. We can now state the following result:

Result 1 *An individual with talent a who sets up a firm in his country has expected profits and labor demand equal to:*

$$E[\Pi(a)] = \frac{a}{2} \frac{Y}{w} \quad (7)$$

$$L(a) = \frac{a}{2} \frac{Y}{w^2} \quad (8)$$

A corollary of result 1 is that:

Result 2 *More productive firms earn higher profits and are larger than less productive ones.*

We will discuss the expected profits of foreign entrepreneurs in section 5. In order to have a suitable benchmark when we allow for cross-border activity, we first solve for the closed economy equilibrium.

4 Closed Economy Equilibrium

At the aggregate level the only relevant price is the wage rate. Given a certain wage, agents choose to become entrepreneurs if and only if:²³

$$w \leq E[\pi(a)] \Leftrightarrow a \geq 2 \frac{w^2}{Y} \equiv x \quad (9)$$

where x is defined as the threshold level of talent that induces an agent to become entrepreneur. It increases with the wage rate and decreases with aggregate income as (i) higher wages make the option of being a worker more appealing and (ii) higher wages and lower GDP make the option of being an entrepreneur less appealing.

Notice from equation (8) that the labor demand depends only on x (and on the entrepreneurial talent, of course). By definition labor supply is also determined by x . This is very convenient as it allows to express the labor market equilibrium as a function of x , and not of Y and w

²³We assume the existence of perfect capital markets, so that only expected profits are relevant.

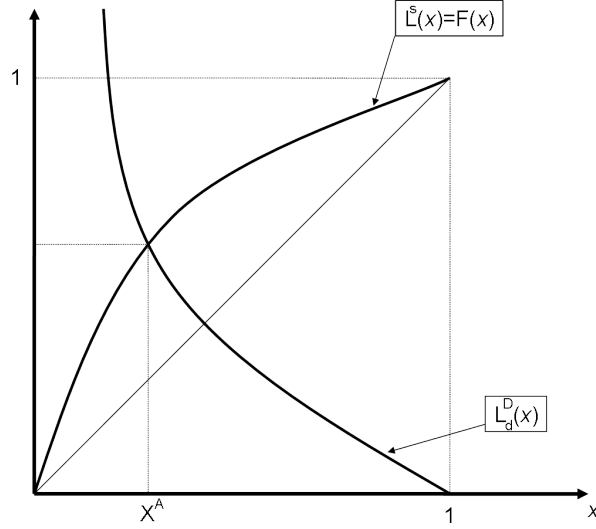


Figure 2: Labor market equilibrium in closed economy

separately. Effectively x is akin to a price that reflects how hard it is to be an entrepreneur, as a higher level of x means that the labor input becomes more expensive (relative to GDP). Thus, x clears the labor market and determines the agents' career paths.

Assuming a continuum of agents of mass one, and given a value of x , labor supply and demand are respectively:

$$L_S(x) = F(x) \quad (10)$$

$$L_D(x) = \int_x^1 \frac{a}{x} dF(a) \quad (11)$$

Labor supply is monotonously increasing in x ; it equals 0 at $x = 0$ (labor being so cheap that everybody would rather be an entrepreneur) and approaches one as $x \rightarrow \infty$ (labor being so expensive that even the smartest agent prefers to be a worker). Labor demand is decreasing in x , equals zero if $x = 1$ (labor being so expensive that nobody wants to be an entrepreneur) and approaches ∞ as $x \rightarrow 0$.

Equilibrium in the economy is attained when (i) career choices (being an entrepreneur or not) are optimally taken; (ii) the labor market clears (labor demand equals the mass of workers); and (iii) aggregate demand equals the total income generated in the economy.

Result 3 Let X^A be the unique solution of

$$L_S(x) = L_D(x) \quad (12)$$

X^A completely characterizes the closed economy equilibrium as the equilibrium wage and aggregate income are respectively:

$$w = \int_{X^A}^1 a dF(a) = [1 - F(X^A)] E(a \mid X^A < a) \quad (13)$$

and

$$Y = 2 \int_{X^A}^1 \frac{a}{X^A} w dF(a) \quad (14)$$

The proof is straightforward, as the shapes of labor supply and demand (described above and depicted in figure 2) guarantee that there exists a unique value X^A that clears the labor market.

In equilibrium, aggregate demand Y equals total output, given by the sum of profits plus the wage bill. Taking into account (12), this amounts to (14). Finally, (13) is derived from (14) and the definition of x .

5 The Open Economy

We now turn to a world where entrepreneurs are allowed to set up firms abroad.²⁴ We focus on “horizontal” FDI, i.e. on investments aiming at establishing production facilities in a foreign country in order to serve the local market by making use of the local workforce. In other words, we restrict to goods that need to be produced in the same geographic location where they are consumed. One can think either of firms providing services, or firms facing substantial trade costs. As discussed in the introduction, there is a general consensus that the overwhelming proportion of FDI is horizontal rather than vertical.²⁵

In our setting, entrepreneurial ability is country-specific and, as we saw in section 3.2, foreign profits are a function of the amount of time spent abroad. Thus, the model acquires a truly dynamic structure. In order to obtain a non-degenerate steady state distribution of firms we assign to each individual an exogenous i.i.d. probability of dying equal to $(1 - \beta)$ and assume the same birth rate in order to keep a constant population. Thus, in each period a proportion $(1 - \beta)$ of the population randomly dies and is replaced by the same number of individuals. Each agent is born with a certain level of talent independently drawn from a certain distribution $F(a)$. Like in Melitz (2003), we assume no time discounting beyond the probability of death. Thus, the discount factor equals the probability of survival, β .

In addition, we assume that each foreign entrepreneur needs to hire one local manager. The local manager does not contribute to the local knowledge of the foreign-owned firm, but is nevertheless necessary for production.²⁶ It can be thought of as representing the need to overcome moral hazard and operational control issues that arise from physical distance. This assumption is needed to make the production technologies of the domestic and foreign production facilities symmetric, with one manager in each plant. This makes sure that there are no increasing returns

²⁴We rule out trade. For a model where FDI and trade are substitutes see for instance Helpman, Melitz and Yeaple (2003).

²⁵We rule out both the licensing alternative (on this see Ethier (1986), Horstmann and Markusen (1987), and Ethier and Markusen (1996)) and “vertical” FDI, in which the production process is fragmented across countries (on this see Helpman (1984), Helpman (1985), Markusen (2002, Ch. 9)).

²⁶We could in principle allow foreign entrepreneurs to hire local managers to help them solving local problems. This would not change the results provided that the talent of the foreign entrepreneurs – and their knowledge of the local circumstances – still affects the productivity of the firm. This happens under reasonable assumptions. For instance, it happens in a world where the ability of the foreign entrepreneur contributes to the choice of the *quality* of the local manager. In any case, this would introduce an unnecessary level of complexity.

to scale generated by FDI.²⁷

The introduction of this fixed costs implies that (in addition to the difference in knowledge) the profits and the labor demand of foreign firms are slightly different from those of local firms summarized in result 1:

Result 4 *Suppose that an individual with talent a has been running a firm abroad for $t - 1$ periods. The expected profits and labor demand of the foreign subsidiary at time t are respectively:*

$$E[\Pi_f(ab(t))] = \frac{a}{2}b(t)\frac{Y}{w} - w = \left(\frac{ab(t)}{x} - 1\right)w \quad (15)$$

$$L_f(ab(t)) = \frac{a}{2}b(t)\frac{Y}{w^2} + 1 = \frac{ab(t)}{x} + 1 \quad (16)$$

We consider symmetric equilibria in two countries that are identical in all respects except their entrepreneurial environments. They differ, but in no respect one is worse than the other; they are just different. As the difference between entrepreneurial environments is also symmetric, in steady state both countries will have the same aggregate income Y , wage w and relative cost of labor x .

5.1 Career-path decisions

We focus on steady state analysis and characterize the values of the three possible career choices that each individual faces: (i) be a worker, (ii) be a domestic entrepreneur or (iii) be a multinational entrepreneur.

In steady state, the value of being a worker and the value of being a domestic entrepreneur are given by $W_w = \frac{w\beta}{1-\beta}$ and $W_d = \frac{w\beta}{1-\beta} \left(\frac{a}{x}\right)$. They equal, respectively, the expected present discounted value of the future streams of wages and profits.

The value of becoming a multinational entrepreneur and operating abroad for the rest of life (this is, the value of *setting up* a firm abroad given that the “effective talent” in the foreign country is $ab(t)$ in each year t) is:

$$W_f = \sum_{s=1}^{\infty} \beta^s \left(\frac{ab(s)}{x} - 1\right)w$$

It is now convenient to define the degree of globalization as *the weighted average of the disadvantage of being a foreigner*, with weights reflecting the point of view of an individual who survives and discounts the future with probability β :

$$c \equiv \sum_{s=1}^{\infty} \frac{\beta^s}{\sum_{s=1}^{\infty} \beta^s} b(s) \in [0, 1] \quad (17)$$

²⁷More in detail, so far we have assumed that domestic entrepreneurs spend their time managing their own firms and therefore cannot work as salaried workers. Thus, choosing to be a domestic entrepreneur implies giving up the wage. This foregone wage generates a per-period fixed cost in the domestic production technology. If there was no identical fixed cost – of exactly one worker – in the production technology of the foreign subsidiary, there would be an asymmetry between the domestic and foreign plants. Investing abroad would reduce the unit cost, as the fixed cost (the foregone wage) could be used among a larger base. By assuming the same fixed cost (of one worker) in the foreign firm we make both branches identical (except in the difficulty of running them, of course).

The value of c measures the degree of globalization, i.e. the inverse of the distance between countries. If two countries are identical $P_0 \rightarrow \infty$ and $c \rightarrow 1$, with c monotonously increasing in P_0 (see equation (6)).²⁸ In our comparative statics exercise we will look at the effects of an exogenous increase in globalization, represented by an increase of c . We can now rewrite W_f as

$$W_f = \frac{w\beta}{1-\beta} \left(c \frac{a}{x} - 1 \right) \quad (18)$$

and notice that if an agent chooses to become a domestic entrepreneur she loses the option to be a worker. Thus, the condition to be a domestic entrepreneur is $W_d \geq W_w$, while the condition to become a foreign entrepreneur (where there is no such an opportunity cost) is simply $W_f \geq 0$.

Two additional important remarks are in order:

- (i) If an agent chooses to become a multinational entrepreneur, she will remain so the rest of her life (as $b(t)$ increases monotonously over time).
- (ii) No agent would choose to be an entrepreneur abroad but not at home (as $W_f \geq 0 \Rightarrow W_d \geq W_w$).

From this, the next result follows:

Result 5 *The career path decisions are determined by the talent of the agent, the degree of globalization and the endogenous variables Y and w , summarized by x :*

- An agent is a worker only if $a \leq x$. The value of this career is $W_w = \frac{w\beta}{1-\beta}$
- An agent is a domestic entrepreneur not investing abroad only if $x \leq a \leq \frac{x}{c}$. The value of this career is $W_d = \frac{w\beta}{1-\beta} \left(\frac{a}{x} \right)$
- An agent is an entrepreneur investing at home and abroad only if $\frac{x}{c} \leq a$. The value of this career is $W_d + W_f = \frac{w\beta}{1-\beta} \left[\frac{a}{x} + \left(c \frac{a}{x} - 1 \right) \right]$

Notice that result 5 implies that agents self-select into the different career paths in a way that is consistent with the empirical evidence on the cross-sectional distribution of firm-size and productivity across domestic and foreign-owned firms. In particular:

Result 6 *Only the largest and most efficient domestic firms open foreign subsidiaries.*

Ample empirical evidence indeed shows that the home activities of multinational firms are in general larger and more productive than national firms with no foreign subsidiaries. Among others, Helpman et al. (2003) find that, controlling for capital intensity and industry, only the most productive firms engage in FDI, while Barba Navaretti and Castellani (2003) find that domestic activities of multinational firms are on average 17% more productive than are national firms with no foreign subsidiaries, even after controlling for size and the sector of the firm. Additionally:

Result 7 *Foreign subsidiaries are larger (and more productive) the larger the home activities of the multinational firm and the longer they have been operating abroad.*

²⁸The lowest value of c is actually $\sum_{s=1}^{\infty} \frac{\beta^s}{\sum_{s=1}^{\infty} \beta^s}$ which approaches zero only as $\beta \rightarrow 0$.

The first theoretical prediction of result 7, that establishes a positive link between the size (and productivity) of domestic and foreign activities of multinational firms looks as very plausible, albeit we have not found any empirical work either proving or disproving it. The lack of studies on this issue is most probably due to the difficulty of finding data that link subsidiaries and headquarters and allow to reconstruct the structure of multinational groups. The second prediction has instead empirical support. Griffith and Simpson (2001), for instance, show that in the U.K. foreign-owned establishments improve their productivity faster with age than U.K.-owned establishments: in their sample after twenty-four years the contribution of age to productivity is almost twice as large in foreign-owned establishments as in domestic-owned ones.

We now turn to the analysis of the open economy steady state.

5.2 Equilibrium

Labor market

It is clear from result 5 that in each country aggregate labor supply is given by the total number of individuals who choose not to be entrepreneurs. Exactly as in the closed economy case, we obtain:

$$L_S(x) = F(x)$$

Labor demand is now the sum of the demand for labor generated by domestic entrepreneurs and the demand for labor generated by foreign entrepreneurs. From result 5 and equation (16) these are respectively:

$$L_D^d(x) = \int_x^1 \frac{a}{x} dF(a) \quad (19)$$

$$L_D^f(x) = \begin{cases} (1 - F(\frac{x}{c})) + (1 - \beta) \sum_{s=1}^{\infty} \beta^s b(s) \int_{\frac{x}{c}}^1 \frac{a}{x} dF(a) & \text{If } x \leq c \\ 0 & \text{If } c \leq x \end{cases} \quad (20)$$

Notice that in the determination of the foreign labor demand, each generation of foreign entrepreneurs has initial size $1 - \beta$ (the agents' birth rate), and in each period only a fraction β of them survives. Given that the individual discount rate and the survival rate coincide, equation (20) can be rewritten as:²⁹

$$L_D^f(x) = \begin{cases} (1 - F(\frac{x}{c})) + c \int_{\frac{x}{c}}^1 \frac{a}{x} dF(a) & \text{If } x \leq c \\ 0 & \text{If } c \leq x \end{cases} \quad (21)$$

²⁹As in all overlapping generations models, if there was individual discounting beyond the survival rate, the sum across people of the size of the cohort after s periods in the foreign market would differ from the individual discount factor of that period. The model in such a case would *not* be intractable, but it would be difficult to define globalization, as there would be a further factor in the demand for labor. Globalization, as it is now, weights the disadvantage of being a foreigner from the point of view of the individuals. In the other case, the weights would depend on the cohort size. If the subjective discount was β and the survival rate was λ , the value of the average from the point of view of the individual (that, thus, determines the productivity thresholds) would be $c \equiv \sum_{s=1}^{\infty} \frac{\beta^s \lambda^s}{\sum_{s=1}^{\infty} \beta^s \lambda^s} b(s)$, while the value of the average appearing in the total labor demand of foreign entrepreneurs would be $\hat{c} \equiv \sum_{s=1}^{\infty} \frac{\lambda^s}{\sum_{s=1}^{\infty} \lambda^s} b(s)$. The effects of an increase of P_0 would differ in the two cases, as the weight given to any point in the future differs in the two cases. While the algebra would be substantially more involved, no deeper insights would be gained.

Labor supply and domestic labor demand are identical to the closed economy case. However, now foreign producers demand labor too. Their demand is decreasing in x , approaches infinity as x approaches zero, and is zero if $x \geq c$. Thus:³⁰

Result 8 *There exist two functions $x(c)$ and $z(c)$ determining the threshold levels of talent needed to become a domestic entrepreneur and to operate a foreign subsidiary, respectively, as a function of the degree of globalization c :*

$$x(c) : [0, 1] \rightarrow [0, 1], \quad x(c) = \begin{cases} X^A & \text{if } c \leq X^A \\ \hat{x}(c) & \text{if } X^A < c \end{cases} \quad (22)$$

where $\hat{x}(c)$ is the (unique) solution of x to:

$$1 = [1 - F(x)] + \int_x^1 \frac{a}{x} dF(a) + \left[1 - F\left(\frac{x}{c}\right)\right] + \int_{\frac{x}{c}}^1 \frac{a}{\frac{x}{c}} dF(a) \quad (23)$$

and:

$$z(c) : [0, 1] \rightarrow [0, 1], \quad z(c) = \begin{cases} 1 & \text{if } c \leq X^A \\ \frac{x(c)}{c} & \text{if } X^A < c \end{cases} \quad (24)$$

Equation (23) states simply that labor supply equals total labor demand (domestic plus foreign).

To understand the intuition behind result 8, notice that only the individuals with talent between $z(c)$ and 1 choose to be foreign entrepreneur: no individual chooses to set up a firm abroad if $c < x \Leftrightarrow 1 < z(c)$. Thus, if there are large differences between entrepreneurial environments, i.e. if $c < x$, the total labor demand just equals the domestic labor demand (see figure 3(a)). Thus, not surprisingly, for relatively high learning costs (where relatively high means precisely that $c < X^A$), the economy is *de facto* in autarchy and $x(c) = X^A$. There are no FDI as it is not worth opening a subsidiary abroad, not even for the most talented foreign entrepreneurs: they would demand labor in the domestic country only if labor services were cheaper, i.e. if $x < c$. Therefore, the threshold needed to become a domestic entrepreneur remains at the closed economy level.

Differently, if the degree of globalization is large enough, i.e. if $X^A < c$, total labor demand is in the relevant range the sum of both domestic and foreign demands, as shown in figure 3(b). In this case, in equilibrium, both domestic and foreign entrepreneurs hire labor in the domestic country. Therefore, the total labor demand cannot be smaller than in autarchy (see again figure 3(b)). As the supply of labor is not affected by the possibility of cross-border investments, in any equilibrium with multinational entrepreneurs (i.e. whenever $X^A < c$) (i) labor is relatively more expensive ($X^A < x(c)$) and consequently (ii) the number of workers is larger (and the number of entrepreneurs smaller) than in autarchy.³¹

³⁰The proof follows from the shapes of the curves and the definition of X^A .

³¹The fact that in each country the mass of agents that become entrepreneurs is smaller if in equilibrium some (high-ability) agents invest across the border does not mean that the number of firms that sell to consumers is smaller, because entrepreneurs from both countries serve them. Actually, the total mass of products will typically increase. Section 6.2 discusses this issue further.

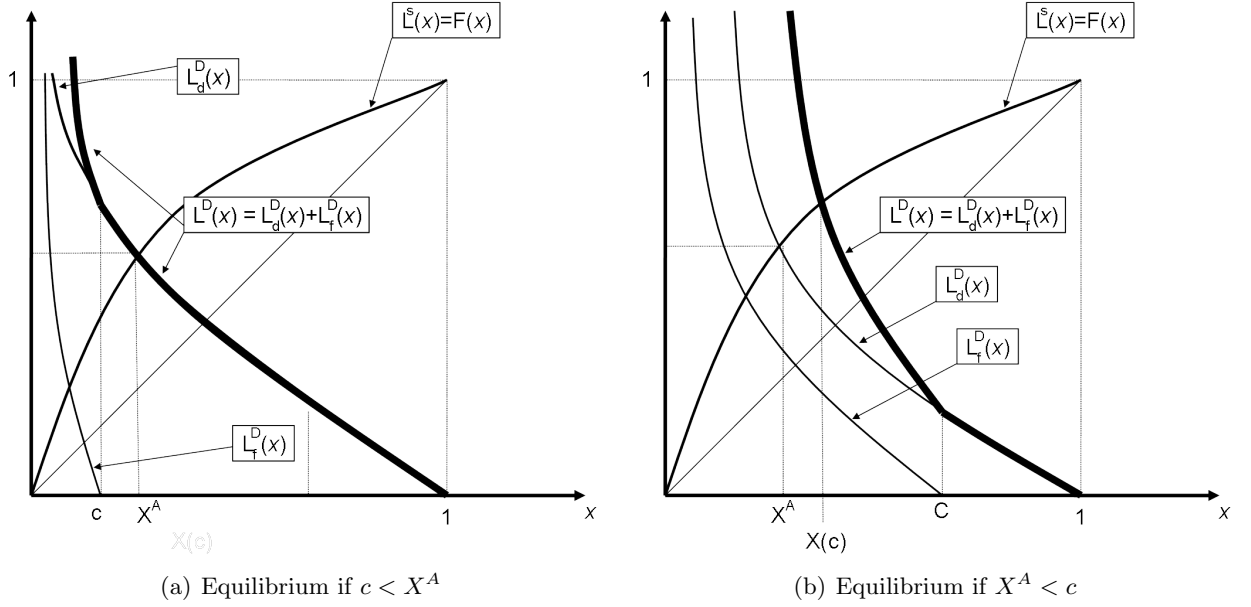


Figure 3: Equilibrium for large (panel 3(a)) and small (panel 3(b)) entrepreneurial distances. In 3(a) the distance between countries is so large ($c < X^A$) that there are no FDI: $x(c) = X^A$. In 3(b) globalization is large enough ($X^A < c$) to allow for FDI: $x(c) > X^A$.

Goods market

In equilibrium, each country's total production must be equal to the income of its inhabitants (earned either at home or abroad), or equivalently, the income generated in each country (independently of the earner's nationality) has to be equal to total production. Taking into account the definition of x in (9) and the definition of $z(c) \equiv \frac{x(c)}{c}$, the following result holds:

Result 9 *Given $x(c)$ and $z(c)$, the equilibrium wage and aggregate income are respectively:*

$$w(c) : [0, 1] \rightarrow \mathbb{R}, \quad w(c) = [1 - F(x(c))] E(a \mid x(c) < a) + c[1 - F(z(c))] E(a \mid z(c) < a) \quad (25)$$

$$Y(c) : [0, 1] \rightarrow \mathbb{R}, \quad Y(c) = 2w(c) \left[\int_{x(c)}^1 \frac{a}{x(c)} dF(a) + \int_{z(c)}^1 \frac{a}{z(c)} dF(a) \right] \quad (26)$$

This completely characterizes the steady state as a function of c . Notice that the wage, in equation (25), is a weighted sum of the average productivities of domestic and foreign entrepreneurs, the weights reflecting the proportion of each group.

Before moving to the comparative statics exercise, it is useful to determine the steady state value of an agent with talent a as a function of c . In order to do that, it is convenient to first define the following two functions:

Definition 3 *Let $\theta(c) : [0, 1] \rightarrow \mathbb{R}$, $\theta(c) = \frac{w(c)}{x(c)} = \frac{Y(c)}{2w(c)}$*

The function $\theta(c)$ determines the profits obtained in the domestic market “per unit of talent”. In other words, the expected operating profit of domestic entrepreneurs with talent a is $\theta(c) \times a$.

Definition 4 Let $\phi(c) : [0, 1] \rightarrow \mathbb{R}$, $\phi(c) = \frac{w(c)}{z(c)} = c\theta(c)$

The function $\phi(c)$ determines the profits (gross of the fixed cost) obtained in the foreign market “per unit of talent”. This is, the expected net operating profit of foreign entrepreneurs with talent a is: $\phi(c) \times a - w$.

Result 10 Let $W_w(c)$, $W_d(c|a)$ and $W_f(c|a)$ be the value of a worker, of a domestic firm and of a foreign firm as a function of c , for a given level of talent of the entrepreneur (a). Then:

$$W_w(c) : [0, 1] \rightarrow \mathbb{R}, \quad W_w(c) = \frac{\beta}{1-\beta} w(c) \quad (27)$$

$$W_d(c|a) : [0, 1] \rightarrow \mathbb{R}, \quad W_d(c|a) = \frac{\beta}{1-\beta} a\theta(c) \quad (28)$$

$$W_f(c|a) : [0, 1] \rightarrow \mathbb{R}, \quad W_f(c|a) = \frac{\beta}{1-\beta} [a\phi(c) - w(c)] \quad (29)$$

The value of an individual with talent a is the following function of c :

$$\begin{aligned} V(c|a) : [0, 1] \rightarrow \mathbb{R}, \quad V(c|a) &= \max \{W_w(c), W_d(c|a), W_d(c|a) + W_f(c|a)\} \\ &= \begin{cases} W_w(c) & \text{If } a \leq x(c) \\ W_d(c|a) & \text{If } x(c) \leq a \leq z(c) \\ W_d(c|a) + W_f(c|a) & \text{If } z(c) \leq a \end{cases} \end{aligned} \quad (30)$$

Result 10 summarizes the results obtained so far pinning down the value function of a generic individual with talent a as a function of the degree of globalization c . This will be useful in the next section where we analyze the welfare effects of an increase in globalization.

6 Effects of Globalization

In this section we analyze the implications of the model concerning the effects of globalization on the distribution and the level of income. We compare the steady states of worlds with different values of c . In the introduction we deemed them as the *Globalized Universe* (highest c) and the *National Universe* (lowest c). We ask how individuals with different values of a fare in response to an increase in globalization, i.e. an increase in c .

6.1 Effects on the Thresholds of Talent

It is clear from figures 3(a) and 3(b) that $x(c)$ is an increasing function. It is also relatively easy to see that the elasticity of $x(c)$ is smaller than one, implying that the threshold to become a foreign entrepreneur $z(c)$ is a decreasing function. In appendix A.1 we prove the following result:

Result 11 *Whenever $c \geq X^A$.³²*

$$\frac{dx(c)}{dc} \frac{c}{x(c)} \in (0, 1) \quad (31)$$

$$\frac{dz(c)}{dc} \frac{c}{z(c)} = \frac{dx(c)}{dc} \frac{c}{x(c)} - 1 \in (-1, 0) \quad (32)$$

Two different effects take place when the entrepreneurial environments become more similar. On the one hand the average local firm is more productive, as the least talented entrepreneurs become workers. On the other hand the threshold to become a foreign entrepreneur decreases, and relatively less talented agents opt to open subsidiaries abroad. Both effects are represented in figure 4. For any given value of c , the number of workers is equal to the mass of agents whose talent is lower than $x(c)$; the number of domestic entrepreneurs who do not invest abroad is given by the mass of agents whose talent lies between $z(c)$ and $x(c)$; and the number of entrepreneurs operating abroad equals the mass of agents with talent larger than $z(c)$.

It is now convenient to formally characterize the *Globalized Universe*, a fully integrated world in which the countries have exactly the same entrepreneurial environments, i.e. $c = 1$, and the learning costs to operate abroad are zero. The fully integrated economy is not equivalent to a single double-sized economy, because in the integrated world setting up a production activity requires a manager in each location: in the integrated world being a manager in the “domestic” market does not allow to save the fixed cost of hiring a manager abroad. Thus, the results that follow do not depend on the presence of increasing returns to scale in production generated by FDI.

Definition 5 *Call X^I the threshold to become domestic entrepreneur in the integrated economy. If $c = 1$, $z(1) = x(1) = X^I$, where X^I is the (unique) value such that:*

$$1 = [1 - F(X^I)] + \int_{X^I}^1 \frac{a}{X^I} dF(a) + [1 - F(X^I)] + \int_{X^I}^1 \frac{a}{X^I} dF(a) \quad (33)$$

Notice in figure 4 that as c moves from X^A to 1, the threshold to become domestic entrepreneur increases monotonically from X^A to X^I , while the threshold to engage in FDI decreases from 1 to X^I . Thus, $X^A < X^I$ for all $c < 1$: in autarchy the equilibrium threshold to be an entrepreneur is smaller than in the integrated economy.

Combining result 10, that illustrates the value of each profession, with result 11, that describes how the career paths of the agents change with c , we can fully characterize the value function of each agent (proof in appendix A.5):

³²Obviously if $c < X^A \rightarrow \frac{dx(c)}{dc} = \frac{dz(c)}{dc} = 0$

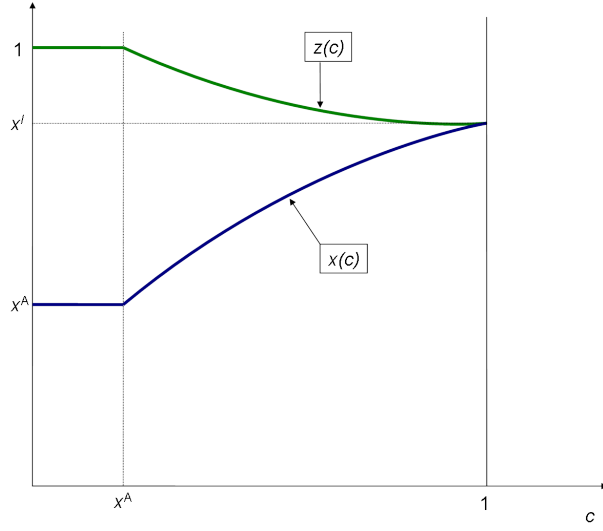


Figure 4: Productivity thresholds for domestic and foreign entrepreneurs as a function of c

Result 12 *The career paths and value functions of the agents are as follows:*

$$\begin{aligned}
 a \leq X^A &\Rightarrow V(c|a) = W_w(c) = \frac{\beta}{1-\beta} w(c) \quad \forall c \\
 X^A \leq a \leq X^I &\Rightarrow V(c|a) = \begin{cases} W_d(c|a) = \frac{\beta}{1-\beta} a \theta(c) & \text{If } X^A \leq c \leq x^{-1}(a) \\ W_w(c) = \frac{\beta}{1-\beta} w(c) & \text{If } x^{-1}(a) \leq c \leq 1 \end{cases} \\
 X^I \leq a \leq 1 &\Rightarrow V(c|a) = \begin{cases} W_d(c|a) = \frac{\beta}{1-\beta} a \theta(c) & \text{If } X^A \leq c \leq z^{-1}(a) \\ W_d(c|a) + W_f(c|a) = \frac{\beta}{1-\beta} [a(\theta(c) + \phi(c)) - w] & \text{If } z^{-1}(a) \leq c \leq 1 \end{cases}
 \end{aligned}$$

Result 12 implies that agents can be categorized into three types according to how their career paths depend on the degree of globalization.

Individuals with a low level of talent: $a < X^A$. They always choose to be workers.

Individuals with an intermediate level of talent: $X^A \leq a \leq X^I$. The career paths of these individuals depend on the degree of globalization. They choose to be domestic entrepreneurs if c , the degree of globalization, is low and therefore there is little foreign competition. If the degree of globalization becomes large enough (larger than $x^{-1}(a)$) they close down the domestic firm and become workers. The reason is that globalization raises wages – making the worker option more attractive – and shrinks domestic profits – making the entrepreneurial career less attractive.

Individuals with a high level of talent: $X^I \leq a \leq 1$. They represent the opposite case with respect to the intermediate ability agents. They never consider to close down the domestic firm as they choose to be entrepreneurs even in the fully integrated economy. Their dilemma is whether to run or not a foreign subsidiary. They do so if the degree of globalization is large

enough (c larger than $z^{-1}(a)$).

6.2 Effects on GDP and Wages

Closer entrepreneurial environments expose low-productivity domestic entrepreneurs to competition from highly-talented foreign entrepreneurs. As a response, they either become workers or produce less because of the higher wages due to the larger labor demand. This improved allocation of talent results in higher aggregate output, wages and productivity. In appendix A.2 we prove the following general result:

Result 13 *The steady state values of wages and output are larger the smaller the entrepreneurial distance between countries:*

$$\frac{dw(c)}{dc} \geq 0, \quad \frac{dY(c)}{dc} \geq 0$$

Thus, if it was possible to redistribute at no cost, globalization would be Pareto improving. There are nevertheless distributional aspects to the story, to which we now turn.

6.3 Effects on Domestic and Foreign Profits

Wages going up are good news to workers but cannot be good news to entrepreneurs. Indeed, the increase in labor demand that pushes wages up has a first order negative effect on the income of domestic entrepreneurs. However, in our imperfectly competitive setting, globalization also generates a positive aggregate demand externality, i.e. a (second order) positive effect on firms profits *via* higher aggregate demand (see result 13). In general, the magnitude of this second effect depends on the shape of the distribution of talents, which determines both how many domestic entrepreneurs become workers after an increase in globalization and the market shares of the entrepreneurs. Thus, in order to establish results on the distributional effects of globalization we need to impose restrictions on the distribution of talent. We will assume that the distribution of talents is such that the following property holds:

Property 1 (Non-Decreasing Mass of Talent)

$$\frac{d\{af(a)\}}{da} = f(a) + af'(a) \geq 0 \quad \forall a \in [X^A, 1] \quad (34)$$

This property simply states that the total “mass of talent” does not decrease as the level of talent increases. In other words, the contribution to total talent of more talented agents is not smaller than the contribution of less talented agents. The reverse may happen only if the mass of high-ability agents was much smaller than the mass of low-ability individuals. Property 1 is far from demanding. It holds in the whole family of Pareto distributions ($F(a) = a^\gamma$; $\gamma \geq 0$), which also includes the uniform ($f(a) = 1, \gamma = 1$). It even holds if the marginal is decreasing ($0 < \gamma < 1$). In the rest of the paper we will assume that $F(a)$ is such that property 1 holds.

In appendix A.3 we prove the following result:

Result 14 *If $F(a)$ is such that property 1 holds, then an increase in the degree of globalization reduces the steady state profits per unit of talent of domestic entrepreneurs and increases the total number of entrepreneurs (domestic and foreign) in the market:*

$$\frac{d\theta(c)}{dc} \leq 0 \quad (35)$$

$$\frac{d(1 - F(x) + 1 - F(z))}{dc} \geq 0 \quad (36)$$

Notice that if the total number of entrepreneurs would decrease as a consequence of an increase in globalization, the profits of the domestic firms could in principle even go up, in spite of the higher wages, as there would be a smaller mass of entrepreneurs sharing a larger cake (as, again, result 13 states that Y always increases with c).³³

The above result implies that, in general, wages grow faster than GDP and domestic firms make lower profits per unit of talent as globalization rises. Therefore, domestic entrepreneurs prefer a world where the entrepreneurial environments are very different, as this difference shelters them from competition from highly talented foreign entrepreneurs.

In principle, also foreign profits may decrease after an increase in globalization because of the higher wages. However, it turns out that the reduction in the learning cost is enough to make foreign profits increasing in the degree of globalization. In appendix A.4 we prove that:

Result 15 *The steady state operating profit (gross of the fixed cost) of foreign subsidiaries $\phi(c)$ increases with globalization: $\frac{d\phi(c)}{dc} \geq 0$. Moreover, for highly-talented individuals who own a foreign subsidiary, an increase in c increases the net profit obtained from foreign subsidiaries:*

$$\text{If } a \geq z(c) \Rightarrow \frac{dW_f(c|a)}{dc} = a \frac{d\phi(c)}{dc} - \frac{dw(c)}{dc} \geq 0 \quad (37)$$

Figure 5 summarizes what discussed so far and draws $\theta(c)$, $\phi(c)$ and $w(c)$. Notice that given a certain level of talent a , the value of being a worker is $w(c)$, the value of being a domestic entrepreneur is $a \times \theta(c)$ (which is strictly decreasing in c and increasing in a), and the value of running a foreign subsidiary is $a \times \phi(c) - w(c)$ (which from result 15 is increasing in both a and c for all individuals that indeed choose to run a foreign subsidiary). Thus, the next result follows readily:

Result 16 *A marginal increase in globalization increases the value of being a worker, decreases the value of a domestic firm and increases the value of a foreign subsidiary (at least for those*

³³Aggregate GDP would increase even in the hypothetical case that the total number of entrepreneurs (and of products) would decrease. The drop in the number of firms, albeit unlikely, might indeed take place in our model and would negatively affect aggregate income given the love for variety implied by the Dixit-Stiglitz preferences. However, even in this case, the positive productivity effect would always dominate and output would increase (as in Melitz, 2003).

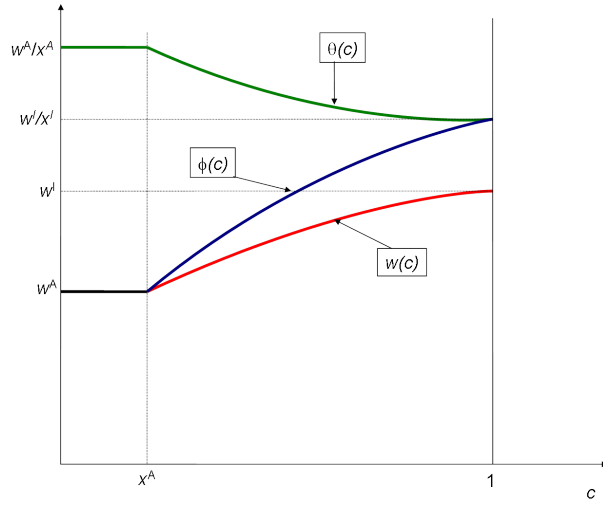


Figure 5: $\theta(c)$, $\phi(c)$ and $w(c)$

who choose to run one):

$$\frac{dW_w(c)}{dc} > 0 \quad \forall a, c \text{ if } c > X^A \quad (38)$$

$$\frac{dW_a(c|a)}{dc} < 0 \quad \forall a, c \text{ if } c > X^A \quad (39)$$

$$\frac{dW_f(c|a)}{dc} > 0 \quad \forall a, c \text{ if } a > z(c) \text{ and } c > X^A \quad (40)$$

Summing up, so far we have established that domestic entrepreneurs would oppose (and dislike) a marginal increase in globalization while workers would favor (and enjoy) it. Owners of foreign subsidiaries have mixed feelings about it, as a marginal increase in globalization raises profits abroad while reducing profits at home. Yet, in the model professional careers are endogenous. Thus, we need to determine whether individuals like (or dislike) globalization as a function of their intrinsic (exogenous) characteristic, their talent, rather than as a function of their profession.

6.4 Winners and Losers from Globalization

6.4.1 Globalization and The Distribution of Income

Empirically, there is compelling evidence of increased compression at the bottom of the income distribution and increased dispersion at the top of the income distribution during the last two decades in the U.S. and Europe. For instance, Autor et al. (2005), Autor et al. (2006) and Machin and Van Reenen (2007) show that since the 1990's the ratio between the income of the 90th and 50th percentiles ("upper tail inequality") has increased in both the U.S. and the U.K., while the ratio of the 50 to 10 percentiles ("lower tail inequality") has decreased.

These dynamics of the distribution of income are consistent with an increase in the degree of globalization which, according to the following results, has a U-shaped effect on the distribution of income:

Result 17 *The ratio of the value of being a worker to the value of being a domestic entrepreneur is monotonously increasing in c :*

$$\frac{W_w(c)}{W_d(c|a)} = \frac{x(c)}{a} \quad ; \quad \frac{d \frac{W_w(c)}{W_d(c|a)}}{dc} \geq 0$$

Result 18 *The ratio of the value of being a domestic entrepreneur with talent a to the value of being a multinational entrepreneur (operating both at home and abroad) with talent \tilde{a} is decreasing in c :*

$$\frac{W_d(c|a)}{W_d(c|\tilde{a}) + W_f(c|\tilde{a})} = \frac{a}{\tilde{a}(1+c) - x} \quad ; \quad \frac{d \frac{W_d(c|a)}{W_d(c|\tilde{a}) + W_f(c|\tilde{a})}}{dc} = -\frac{a \left(\tilde{a} - z(c) \frac{dx/x}{dc/c} \right)}{(\tilde{a}(1+c) - x)^2} \leq 0$$

The intuition is straightforward. Globalization raises the wage rate, thus favoring “workers”, and reduces the operating profits per unit of talent (θ) of domestic firms, thus harming “domestic entrepreneurs”. Workers’ income must therefore improve relative to the income of the domestic entrepreneurs and the difference between middle- and low-income agents must decrease. Moreover, as globalization increases, domestic entrepreneurs only suffer from the fall in domestic profits, while the entrepreneurs operating abroad also enjoy higher foreign profits. Thus, the well-being of foreign entrepreneurs always improves vis-a-vis domestic entrepreneurs.

This implies that the position of the “middle class” deteriorates *relative* to both low- and high-income agents. As globalization increases, the lower tail of the distribution benefits from higher wages, while the upper tail benefits from higher foreign profits. Domestic entrepreneurs (the “middle class”) are not talented enough to benefit from the easier access to foreign markets and suffer from the higher wages caused by foreign entry in the domestic market.

Our results so far refer to the professions of the agents. However, agents can (and do) change their (steady state) career paths as globalization changes. It is straightforward to extend the above results to agents with different levels of talent. To start with, notice that among the individuals with $a \geq X^A$ (arguably, the interesting ones) only those with three specific levels of talent never change profession: (i) individuals with $a = X^A$, who are always workers and are the prototypical individuals with low talent (and income); (ii) individuals with $a = X^I$, who always choose to be domestic entrepreneurs and never open foreign subsidiaries: they are the prototypical individuals with an intermediate level of talent (and income); (iii) individuals with $a = 1$, who open a foreign subsidiary whenever $c \geq X^A$: they are the prototypical individuals with high talent (and income).

Using results 12, 17 and 18, it is immediate to prove the following two results:

Result 19 *The ratio of the value of being an agent with talent $a = X^A$ to the value of being an agent with talent $a = X^I$ is increasing in the degree of globalization.*

Result 20 *The ratio of the value of being an agent with talent $a = X^I$ to the value of being an agent with talent $a = 1$ is decreasing in the degree of globalization.*

The above results can be easily generalized as follows:

Result 21 *Any increase in globalization produces a decrease in lower tail inequality and an increase in upper tail inequality:*

$$\begin{aligned} \forall a, \tilde{a} : \quad a < \tilde{a} < X^I &\implies \frac{d \frac{V(a|c)}{V(\tilde{a}|c)}}{dc} \geq 0 \\ \forall a, \tilde{a} : \quad X^I < a < \tilde{a} \text{ and } a < z(c) &\implies \frac{d \frac{V(a|c)}{V(\tilde{a}|c)}}{dc} \leq 0 \end{aligned}$$

The productivity threshold X^I is special, in the sense that the agents with talent smaller or larger than X^I are affected by globalization in ways that are qualitatively different.

As globalization increases, (a fraction of the) agents with talent below X^I get expelled from the entrepreneurial class and join the working class.³⁴ Now, notice that while the entrepreneurial income is proportional to talent, the wage rate is not. Additionally, an increase in globalization makes the entrepreneurial income less sensitive to talent (due to the decrease in θ), while the wage rate increases. Thus, globalization must reduce the income dispersion within the group of individuals with talent smaller than X^I .

Differently, the agents with talent larger than X^I are always domestic entrepreneurs and have to decide whether to open or not a foreign subsidiary. Those who do not do so undoubtedly lose from globalization, as domestic profits fall. For those who do have a foreign subsidiary globalization has the redeeming property of increasing foreign profits. Thus, globalization necessarily increases the dispersion of income within the group of individuals with talent larger than X^I .³⁵

Thus, our model predicts that an increase in globalization will result in an increase of “lower tail inequality” along with an increase in “upper tail inequality”, at least partially explaining the trends of inequality during the last two decades.

6.4.2 Winners and Losers in Absolute Terms

It is now easy to look at who wins and who loses in absolute (and not only relative) terms. We know from result 16 that a marginal increase in globalization increases wages, decreases the profits of domestic firms, and increases the profits of foreign subsidiaries. We also know from result 12 the profiles of the individual career paths. Thus, we can easily identify the (steady state) winners and losers from any change in the distance between entrepreneurial environments.

First, it is straightforward that individuals with little talent ($a < X^A$) have a monotonously increasing value function. They always enjoy more globalization, as they are always workers, and the demand for their labor services increases when the entrepreneurial environments become more similar.

It is also clear that the individuals with intermediate talent ($X^A \leq a \leq X^I$) have a U-shaped value function that achieves a minimum at $c = x^{-1}(a)$, the value of c at which they become workers. Not all of them fare in the same manner after an increase in globalization, though. The

³⁴In a fully globalized world all agents with talent below X^I are workers.

³⁵What complicates matters slightly is that it is not clear what are the effects of globalization on the dispersion of income within the group of agents who operate abroad (notice the qualification in equation (41) that $a < z(c)$). This is because the fixed cost of operating abroad (w) increases with globalization, so that even if operating profits increase globalization may end up compressing the incomes of multinational entrepreneurs. If there was no fixed cost their income would be proportional to their talent, and their ratio would be left unchanged by globalization.

individuals with talent $a = X^A$, who in the closed economy are indifferent across career paths, are better off after any increase of c . At the other extreme, the individuals with talent $a = X^I$ are always worse off, as they are always domestic entrepreneurs who do not invest abroad. Thus, the agents in this range win or lose from an increase in globalization depending on both the initial and final level of globalization and their own level of talent. To be more specific, within this group, the individuals with a relatively low level of talent will tend to be net winners from globalization, while the individuals with a relatively high level of talent will tend to lose from it. It is straightforward³⁶ to prove the following result:

Result 22 *Consider two degrees of globalization c_l and c_h , with $X^A \leq c_l < c_h \leq 1$. Notice that $X^A \leq x(c_l) < x(c_h) \leq X^I$. Then, there exists a level of talent $a^* = \frac{w(c_h)}{\theta(c_l)}$ such that $x(c_l) < a^* < x(c_h)$ and:*

$$\forall a \in [X^A, X^I] \rightarrow \begin{cases} \text{If } X^A \leq a < a^* & \Rightarrow V(c_l|a) < V(c_h|a) \\ \text{If } a = a^* & \Rightarrow V(c_l|a) = V(c_h|a) \\ \text{If } a^* \leq a < X^I & \Rightarrow V(c_l|a) > V(c_h|a) \end{cases}$$

Notice that (within this group) the high-ability individuals lose from increased globalization, while the low-ability ones win. Notice also that *not* all the individuals who end up being workers when globalization is high (i.e. when $c = c_h$) prefer the more open world to the less globalized universe with $c = c_l$: in particular, the individuals with $a \in (a^*, x^{-1}(c_h))$ choose to be workers in the globalized world, but would rather live in the less globalized world and be domestic entrepreneurs.

The reason lies in the compression of incomes that takes place at the bottom of the distribution. The lower the degree of globalization the more income depends on talent (both because a larger fraction agents are entrepreneurs and because the entrepreneurial income reacts more to talent). After an increase in c , incomes become more equal. Average income is larger, but the individuals who used to have a valuable asset (their knowledge of the local economy) have (partially) lost it. This knowledge was more valuable the larger the level of talent. Thus, relatively more talented individuals lose relatively more. In general, within this group, the winners from an increase in globalization are those whose income in an environment with low globalization was not much higher than the wage, because they join the working class and win from the general increase in wages. Individuals who were substantially better off than workers are bound to lose from an increase in c , even if they end up joining the working class.

We now turn to the individuals with the largest level of talent ($a > X^I$). They never consider the possibility of becoming workers and have to decide whether to invest abroad or not. Independently of the effect of globalization on foreign profits, they all dislike the drop in the domestic profits due to the larger wages that globalization brings about. Thus, within this group, the individuals who are almost indifferent between setting up a foreign subsidiary or not are bound to lose from globalization:³⁷

³⁶Just notice that the value functions of all agents with $a \in [X^A, X^I]$ are U-shaped and that at the right of the minimum ($c = x^{-1}(a)$) they are all equal to $w(c)$, which is independent of a , while for smaller c the value function is $a \times \theta(c)$. Continuity of the value function implies the result.

³⁷The proof is straightforward: consider the individual with $a = z(c_h)$, clearly $V(c_l|a = z(c_h)) = W_d(c_l|a =$

Result 23 Consider two degrees of globalization c_l and c_h , with $X^A \leq c_l < c_h \leq 1$. Notice that $X^I \leq z(c_h) < z(c_l) \leq 1$. Then, there exists a level of talent a^* such that $z(c_h) < a^*$ and:

$$\forall a \in [X^I, a^*) \Rightarrow V(c_l|a) > V(c_h|a)$$

The increase in labor costs due to globalization makes the least talented individuals (among the highest-ability ones that never consider being workers) worse-off after an increase in globalization. This implies that some agents that in the more globalized universe (c_h) would choose to have a firm abroad still prefer to live in a world with a lower degree of globalization (c_l), even if in such a case they would not be active in the foreign market.

Result 20 shows that the most talented individuals (multinational entrepreneurs) do always better *relative* to the individuals with talent close to X^I (domestic entrepreneurs) when the degree of globalization increases. The remaining issue we need to address concerns the absolute level of the well-being of the top agents who own a foreign subsidiary on top of a domestic firm. These individuals, while suffering from lower profits at home, enjoy larger profits abroad when globalization increases. Thus, if the losses in the domestic market are smaller than the foreign gains, they win in *absolute* (and not only in *relative*) terms.

If this was not the case (that is, if the losses in the domestic market happen to be larger than the gains abroad) the very talented agents would lose from an increase in globalization.³⁸ In terms of result 23, a^* would be equal to one, and all the high-ability agents would suffer from an increase of c . *Even in this case, however, their losses would always be smaller than the losses suffered by less talented agents who do not invest abroad.*

Conversely, if the gains in the foreign market are larger than the domestic losses, the value of being an entrepreneur with a foreign subsidiary ($W_d + W_f$) is increasing and therefore the value function of the agents with $a \geq X^I$ is U-shaped. This happens not because at some point they become workers, but because at some point ($c = z^{-1}(a)$) they start enjoying foreign profits.

Without additional restrictions on the distribution of talents, the net outcome can in principle go either ways. Appendix A.6 shows that if talent is uniformly distributed the gains from foreign subsidiaries are always larger than the domestic losses.³⁹

In this case the most talented agents are net winners from globalization:⁴⁰

Result 24 Consider two degrees of globalization c_l to c_h , with $X^A \leq c_l < c_h \leq 1$. Notice that $X^I \leq z(c_h) < z(c_l) \leq 1$. Assume further, that the distribution of talent $F(a)$ is such that $\frac{d(W_d+W_f)}{dc} > 0$ (a sufficient condition is $F(\cdot)$ uniform).

$z(c_h)) > W_d(c_h|a = z(c_h)) = W_d(c_h|a = z(c_h)) + W_f(c_h|a = z(c_h))$. By continuity of the value function with respect to a , the strict inequality needs to hold also for some values of a larger than $z(c_h)$.

³⁸This is nevertheless unlikely to happen, particularly if the number of countries is large, as in this case the gains obtained abroad represent a large fraction of the income of foreign entrepreneurs.

³⁹The uniform assumption is a sufficient, by no means necessary, condition. In numerical experiments with two countries, we found no combination of parameters where the total profits of multinational entrepreneurs are decreasing in the degree of globalization. Nevertheless we could not prove the generality of this result.

⁴⁰To prove it, first notice that in this case the individual with $a = 1$ is certainly a net winner from globalization (she gains as she owns a foreign subsidiary $\forall c \geq X^A$). Additionally, we know that the agent with $a = z(c_h)$ loses from the increase. By continuity there is an individual in between who is indifferent (a^*), with anybody on her left being a net loser and anybody on her right being a winner.

Then, there exists a level of talent a^* such that $z(c_h) < a^* < 1$ and:

$$\forall a \in [X^I, a^*) \Rightarrow V(c_l|a) > V(c_h|a) \quad (41)$$

$$\text{If } a = a^* \Rightarrow V(c_l|a) = V(c_h|a) \quad (42)$$

$$\forall a \in (a^*, 1] \Rightarrow V(c_l|a) < V(c_h|a) \quad (43)$$

Notice that the least talented agents among those that in a globalized world choose to operate abroad (those with $a \in [X^I, a^*)$) would rather live in a less globalized environment, as they prefer c_l to c_h . Thus, other than the workers, only the agents at the very top of the distribution may win from globalization. This is because entrepreneurs benefit from a higher value of c only if they own a large foreign subsidiary, and they do so only if they are very talented.

Concluding, globalization always produces winners and losers. Individuals at the bottom of the distribution always win, as the demand for their labor services increases. Individuals in the middle of the distribution always lose, as they lose a valuable asset (knowledge on the specificities of the local economy that foreigners ignore) without gaining anything. Individuals at the top of the distribution typically win, and their relative position vis-à-vis the middle-income individuals always improves, due to the fact that even though they are forced to pay larger wages, they also reap the benefits of accessing to larger markets: they lose an asset (exclusive knowledge on the local economy) but they acquire another one (knowledge on the foreign one).

7 Concluding remarks

This paper first presents empirical evidence on the positive effect of cross-country proximity in “entrepreneurial environments” on bilateral FDI. By exploiting the *OECD International Direct Investment Statistics* and data on nationwide regulation levels from the OECD and the World Bank, we find evidence that larger similarities in the economic environment tend to be associated with larger bilateral FDI, after controlling for the *levels* of regulation in both countries, for countries fixed effects and for time effects.

Motivated by this evidence, we build a general equilibrium model that – while consistent with the main stylized facts about FDI – allows to study the distributional effects of globalization. In the model, agents are heterogeneous and differ both in their ability to be entrepreneurs and their nationality. Entrepreneurs *may* set up a firm abroad, i.e. engage in FDI. If they do so, they incur in the additional cost of *learning* how the foreign environment works. In this framework, globalization fosters FDI and improves the allocation of talents in the economy boosting wages, output, and productivity.

The mechanism is as follows. Only the more able entrepreneurs engage in FDI, and their fraction grows larger the “easier” it is to set up a firm abroad, i.e. the more similar the domestic and foreign entrepreneurial environments. This, in turn, increases the demand for domestic labor, output and wages. As a consequence, the minimum ability level needed to become an entrepreneur goes up. This implies that the size of the pool of entrepreneurs goes down while its composition changes: a greater proportion engages in FDI. Hence, globalization improves the

allocation of talent of the economy because the increase in the wage rate dissuades low-ability agents to become entrepreneurs. At the same time, even if less people opt for an entrepreneurial career, a larger fraction serve clients abroad, implying that the variety of products that costumers may acquire increases.

The model implies that globalization increases aggregate productivity, wages and GDP. However, not everybody wins. Low ability agents always gain, as the demand for their labor services increases. The agents who would be entrepreneurs in a fully closed economy lose on an asset (the exclusive knowledge of the local economy) and gain on another (the ability to invest abroad at lower cost). The individuals with an intermediate level of talent lose very much on the first asset and gain very little on the second, as they cannot compete with high-ability agents in a globalized world, while the agents with a high level of talent obtain very high gains on the second asset, ending up as net winners. Thus, an increase in globalization has a U-shaped effect on the distribution of income, worsening the situation of the middle class vis-à-vis the top and the bottom of the distribution.

This paper leaves a number of interesting questions open for future research. First, the model suggests that the dynamics of globalization are interesting *per se*. Looking at figure 4 in the light of result 16, it is clear that the opposition to a marginal increase to globalization should be smaller the larger that the level of globalization. If globalization was a slow and exogenous process (perhaps driven by cultural developments) one should expect the number of its opponents to decrease over time, as more and more individuals benefit from it by either becoming workers or starting to invest abroad. This question is best addressed looking at the transitional dynamics of a full-blown dynamic model. Additionally, the model may be extended to endogenize the degree of similitude between entrepreneurial environments. So far, the analysis suggests that the process of nation-building that derives from the fragmentation of a larger political unit is led by “mediocre” individuals, the ones who win more from the creation of differences in entrepreneurial environments. We intend to explore these issues both at the empirical and the theoretical level.

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Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	N	Max	Min
FDI Stocks (million \$)	5617	17172	5371	277613	-1207
GDP per capita of reporting cty (\$)	19479	9518	5371	44951	1781
GDP per capita of partner cty (\$)	20216	9780	5371	44951	1194
Population of reporting cty (thousands)	56604	67202	5371	289821	3562
Population of partner cty (thousands)	47502	62461	5371	289821	3439
Geographical variables					
(Log) distance between main cities	7.98	1.15	5371	9.9	5.38
Common border dummy	.105	.307	5371	1	0
EU Dummy	.264	.441	5371	1	0
Nafta dummy	.00894	.0941	5371	1	0
Latin country dummy	.0317	.175	5371	1	0
Common language dummy	.105	.306	5371	1	0
Both in Asia Pacific	.00968	.0979	5371	1	0
Both in North America	.0227	.149	5371	1	0
OECD regulation variables: distance between country pairs					
Product market regulation	.637	.509	5371	2.8	0
Barriers to Trade and Investment	.812	.771	5371	3.3	0
Barriers to Entrepreneurship	.749	.537	5371	2.9	0
State control	1.1	.779	5371	3.6	0
Administrative Regulation	.948	.644	5371	3	0
Economic Regulation	.919	.663	5371	3	0
Inward-oriented regulation	.793	.593	5371	2.8	0
Outward-oriented regulation	.745	.698	5371	3.3	0
Employment protection regulation	1.32	.921	4698	4	0
World bank regulation variables: distance between country pairs					
<i>Starting a Business</i>					
N. of procedures	3.43	2.42	5371	13	0
N. of days	23.7	21.7	5371	105	0
Cost (% of income per capita)	8.83	7.39	5371	35.2	.1
Minimum capital (% of income per capita)	44.6	49.4	5371	238	0
<i>Hiring and Firing</i>					
Difficulty of hiring	29.5	21.8	5371	78	0
Rigidity of hours	28	23	5371	80	0
Difficulty of firing	23.4	20.5	5371	90	0
Rigidity of employment	24.4	16.7	5371	69	0
Firing costs (number of weeks)	32.6	27.1	5371	133	0
<i>Registering Property</i>					
N. of procedures	2.73	2.17	5371	11	0
N. of days	48.1	57.9	5371	203	0
Cost (% of property value per capita)	2.92	2.39	5371	13.5	0
<i>Getting Credit</i>					
Cost to create collateral	8.09	8.56	5371	29.5	0
Legal rights index	2.78	2	5371	9	0
Credit information index	1.05	.847	5371	3	0
Public registry coverage	68.9	165	5371	637	0
Private bureau coverage	422	308	5371	1000	0
<i>Protecting Investors</i>					
Disclosure Index	1.02	.909	5371	5	0
<i>Enforcing Contracts</i>					
N. of procedures	7.27	6.26	5371	30	0
N. of days	285	353	5371	1342	1
Cost (% of debt)	5.52	3.76	5371	16.9	.1
<i>Closing a Business</i>					
Number of years	1.05	.903	5371	4.1	0
Cost (% of estate)	6.3	5.42	5371	22	0
Recovery Rate (cents on the dollar)	21.7	15.4	5371	66.7	0

Table 2: Countries

Australia	Austria	Canada	Denmark	Finland	France
Great Britain	Greece	Germany	Hungary	Ireland	Italy
Japan	Mexico	Netherlands	New Zealand	Norway	Portugal
Poland	Spain	Sweden	Switzerland	Turkey	USA

Table 3: Closest and farthest country pairs

Closest	Farthest
AUS-IRL	FRA-GBR
CAN-AUS	GBR-GRC
DEN-CHE	GBR-ITA
FIN-AUT	GBR-POL
GBR-AUS	GBR-PRT
GBR-CAN	GBR-TUR
GER-AUT	GRC-AUS
IRL-GBR	GRC-CAN
JPN-AUT	GRC-IRL
JPN-GER	ITA-CAN
NLD-AUT	NZL-GRC
NLD-FIN	NZL-POL
NLD-GER	NZL-TUR
NLD-JPN	POL-AUS
NOR-FIN	POL-CAN
NZL-AUS	POL-ESP
NZL-CAN	POL-IRL
NZL-USA	PRT-CAN
PRT-ESP	TUR-AUS
SWE-AUT	TUR-CAN
SWE-FIN	TUR-IRL
SWE-GER	USA-GRC
SWE-NLD	USA-ITA
USA-AUS	USA-POL
USA-CAN	USA-PRT
USA-GBR	USA-TUR

Table 4: **OECD variables: log-linear model**

Regulation Variables	Dependent variable: Log of FDI Stocks.								
	1	2	3	4	5	6	7	8	9
Common language	0.102 (0.008)***	0.107 (0.008)***	0.098 (0.008)***	0.091 (0.008)***	0.096 (0.008)***	0.102 (0.008)***	0.108 (0.008)***	0.085 (0.009)***	0.081 (0.008)***
<i>Distance between regulations:</i>									
Product market regulation	-0.027 (0.011)*								
Barriers to Trade and Investment		0.023 (0.011)*							
Barriers to Entrepreneurship			-0.037 (0.008)***						
State control				-0.048 (0.009)***					
Economic Regulation				-0.039 (0.009)***					
Administrative Regulation						-0.023 (0.007)***			
Overall outward-oriented regulation							0.025 (0.012)*		
Overall inward-oriented regulation								-0.058 (0.011)***	
Employment protection regulation									-0.040 (0.008)***
R-squared	0.841 4998	0.841 4998	0.841 4998	0.842 4998	0.841 4998	0.841 4998	0.841 4998	0.842 4998	0.843 4485
N									

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 5: World Bank variables: log-linear model

Regulation Variables	Dependent variable: Log of FDI Stocks.								
	1	2	3	4	5	6	7	8	9
Common language	0.102 (0.008)***	0.101 (0.008)***	0.101 (0.008)***	0.100 (0.008)***	0.099 (0.007)***	0.087 (0.008)***	0.081 (0.008)***	0.082 (0.008)***	0.103 (0.007)***
<i>Distance between regulations: Starting a Business</i>									
N. of procedures	-0.035 (0.009)***								
N. of days		-0.039 (0.013)**							
Cost (% of income per capita)			-0.031 (0.008)***						
Minimum capital (% of income per capita)				-0.034 (0.015)*					
<i>Distance between regulations: Hiring and Firing</i>									
Difficulty of hiring					-0.047 (0.008)***				
Rigidity of hours						-0.068 (0.010)***			
Difficulty of firing							-0.088 (0.010)***		
Rigidity of employment								-0.071 (0.009)***	
Firing costs (number of weeks)									-0.055 (0.010)***
R-squared	0.841 4998	0.841 4998	0.841 4998	0.841 4998	0.842 4998	0.842 4998	0.843 4998	0.843 4998	0.842 4998
N									

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 6: World Bank variables: log-linear model

Regulation Variables	Dependent variable: Log of FDI Stocks.							
	1	2	3	4	5	6	7	8
Common language	0.109 (0.008)***	0.108 (0.008)***	0.109 (0.008)***	0.107 (0.008)***	0.104 (0.007)***	0.106 (0.008)***	0.102 (0.008)***	0.110 (0.008)***
<i>Distance between regulations: Registering Property</i>								
N. of procedures	-0.025 (0.009)**							
N. of days		-0.067 (0.012)***						
Cost (% of property value per capita)			-0.023 (0.010)*					
<i>Distance between regulations: Getting Credit</i>								
Cost to create collateral (% of income per capita)				-0.006 (0.014)				
Legal rights index					-0.041 (0.009)***			
Credit information index						-0.037 (0.007)***		
Private bureau coverage							-0.016 (0.007)*	
Public registry coverage								-0.192 (0.018)***
R-squared	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.842
N	4998	4998	4998	4998	4998	4998	4998	4998

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 7: World Bank variables: log-linear model

Dependent variable: Log of FDI Stocks.							
Regulation Variables	1	2	3	4	5	6	7
Common language	0.112 (0.008)***	0.098 (0.008)***	0.108 (0.008)***	0.109 (0.008)***	0.108 (0.008)***	0.111 (0.008)***	0.108 (0.008)***
<i>Distance between regulations: Protecting Investors</i>							
Disclosure Index	0.015 (0.008)						
<i>Distance between regulations: Enforcing Contracts</i>							
Number of procedures		-0.055 (0.013)***					
Number of days			-0.012 (0.021)				
Cost (% of debt)				-0.052 (0.007)***			
<i>Distance between regulations: Closing a Business</i>							
Number of years					-0.008 (0.010)		
Cost (% of estate)						-0.071 (0.009)***	
Recovery Rate (cents on the dollar)							-0.032 (0.007)***
R-squared	0.841 4998	0.841 4998	0.841 4998	0.842 4998	0.841 4998	0.843 4998	0.841 4998

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 8: OECD variables: PPML model

Regulation Variables	Dependent variable: Volume of FDI Stocks.								
	1	2	3	4	5	6	7	8	9
Common language	0.109 (0.017)***	0.145 (0.013)***	0.137 (0.015)***	0.067 (0.017)***	0.091 (0.017)***	0.152 (0.015)***	0.145 (0.013)***	0.068 (0.020)***	0.121 (0.018)***
<i>Distance between regulations:</i>									
Product market regulation	-0.107 (0.031)***								
Barriers to Trade and Investment		0.005 (0.046)							
Barriers to Entrepreneurship			-0.027 (0.020)						
State control				-0.161 (0.022)***					
Economic Regulation					-0.135 (0.025)***				
Administrative Regulation						0.015 (0.016)			
Overall outward-oriented regulation							0.067 (0.052)		
Overall inward-oriented regulation								-0.156 (0.029)***	
Employment protection regulation									-0.040 (0.016)*
R-squared	0.597 5244	0.597 5244	0.597 5244	0.598 5244	0.597 5244	0.597 5244	0.597 5244	0.597 5244	0.587 4599
N									

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 9: World Bank variables: PPML model

Regulation Variables	Dependent variable: Volume of FDI Stocks.								
	1	2	3	4	5	6	7	8	9
Common language	0.146 (0.014)***	0.148 (0.014)***	0.124 (0.015)***	0.136 (0.015)***	0.149 (0.014)***	0.124 (0.014)***	0.099 (0.015)***	0.118 (0.015)***	0.140 (0.013)***
<i>Distance between regulations: Starting a Business</i>									
N. of procedures	0.005 (0.027)								
N. of days		0.052 (0.050)							
Cost (% of income per capita)			-0.100 (0.028)***						
Minimum capital (% of income per capita)				-0.048 (0.031)					
<i>Distance between regulations: Hiring and Firing</i>									
Difficulty of hiring					0.020 (0.022)				
Rigidity of hours						-0.091 (0.019)***			
Difficulty of firing							-0.162 (0.020)***		
Rigidity of employment								-0.081 (0.017)***	
Firing costs (number of weeks)									-0.182 (0.027)***
R-squared	0.597	0.597	0.597	0.597	0.597	0.597	0.598	0.597	0.597
N	5244	5244	5244	5244	5244	5244	5244	5244	5244

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 10: World Bank variables: PPML model

Regulation Variables	Dependent variable: Volume of FDI Stocks.							
	1	2	3	4	5	6	7	8
Common language	0.145 (0.013)***	0.145 (0.013)***	0.146 (0.013)***	0.143 (0.013)***	0.151 (0.013)***	0.110 (0.014)***	0.158 (0.016)***	0.147 (0.013)***
<i>Distance between regulations: Registering Property</i>								
N. of procedures	-0.031 (0.029)							
N. of days		-0.052 (0.040)						
Cost (% of property value per capita)			-0.021 (0.027)					
<i>Distance between regulations: Getting Credit</i>								
Cost to create collateral (% of income per capita)				-0.192 (0.046)***				
Legal rights index					-0.087 (0.027)**			
Credit information index						-0.150 (0.021)***		
Private bureau coverage							0.032 (0.020)	
Public registry coverage								-0.632 (0.039)***
R-squared	0.597	0.597	0.597	0.597	0.597	0.598	0.597	0.598
N	5244	5244	5244	5244	5244	5244	5244	5244

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 11: World Bank variables: PPML model

Dependent variable: Volume of FDI Stocks.							
Regulation Variables	1	2	3	4	5	6	7
Common language	0.123 (0.016)***	0.090 (0.016)***	0.167 (0.014)***	0.165 (0.014)***	0.148 (0.014)***	0.143 (0.013)***	0.145 (0.013)***
<i>Distance between regulations: Protecting Investors</i>							
Disclosure Index	-0.042 (0.018)*						
<i>Distance between regulations: Enforcing Contracts</i>							
Number of procedures		-0.266 (0.035)***					
Number of days			0.301 (0.081)***				
Cost (% of debt)				-0.117 (0.019)***			
<i>Distance between regulations: Closing a Business</i>							
Number of years					-0.019 (0.024)		
Cost (% of estate)						0.034 (0.035)	
Recovery Rate (cents on the dollar)							-0.007 (0.017)
R-squared	0.597	0.598	0.597	0.598	0.597	0.597	0.597
N	5244	5244	5244	5244	5244	5244	5244

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

A Proofs

A.1 Proof of Result 11

We can rewrite the labor market equilibrium condition (23) in function of x and z . We call this relationship LM:

$$1 = [1 - F(x)] + \int_x^1 \frac{a}{x} dF(a) + [1 - F(z)] + \int_z^1 \frac{a}{z} dF(a) \quad (44)$$

Differentiating totally (44) with respect to x and z :

$$\left. \frac{dx}{dz} \right|_{LM} = - \frac{-2f(z) - \int_z^1 \frac{a}{z^2} dF(a)}{-2f(x) - \int_x^1 \frac{a}{x^2} dF(a)} \leq 0 \quad (45)$$

And thus, the elasticity of x wrt z along LM:

$$\left. \frac{dx/x}{dz/z} \right|_{LM} = - \frac{-2zf(z) - \int_z^1 \frac{a}{z} dF(a)}{-2xf(x) - \int_x^1 \frac{a}{x} dF(a)} \leq 0 \quad (46)$$

The definition of $z \equiv \frac{x(c)}{c}$ implies that $dx/x = dc/c + dz/z$. Thus:

$$\frac{dx/x}{dc/c} = \frac{2zf(z) + \int_z^1 \frac{a}{z} dF(a)}{2zf(z) + \int_z^1 \frac{a}{z} dF(a) + 2xf(x) + \int_x^1 \frac{a}{x} dF(a)} \in (0, 1) \quad (47)$$

$$\frac{dz/z}{dc/c} = - \frac{2xf(x) + \int_x^1 \frac{a}{x} dF(a)}{2zf(z) + \int_z^1 \frac{a}{z} dF(a) + 2xf(x) + \int_x^1 \frac{a}{x} dF(a)} \in (-1, 0) \quad (48)$$

QED

A.2 Proof of Result 13

First, define two functions:

$$g(x) = g_x \equiv xf(x),$$

$$D(x) = D_x \equiv \int_x^1 \frac{a}{x} dF(a),$$

Notice that both $g(x)$ and $D(x)$ are non negative and that $D(x)$ is decreasing:

$$dD(x) = -(g_x + D_x) \frac{dx}{x}$$

It is now useful to notice that, being $\theta = \frac{Y(c)}{2w(c)}$, equation (26) implies that

$$\theta = (D_x + D_z)$$

Then:

$$d\theta = - \left[(g_x + D_x) \frac{dx}{x} + (g_z + D_z) \frac{dz}{z} \right]$$

Which after some algebra results in:

$$d\theta = - \frac{g_z D_x - g_x D_z}{(2g_z + D_z)} \frac{dx}{x}$$

We can now prove the following two results.

A.2.1 Wages increase with globalization

$$w = x\theta$$

$$\frac{dw}{w} = \frac{dx}{x} + \frac{d\theta}{\theta}$$

Then:

$$\begin{aligned} \frac{dw}{w} &= \left(1 - \frac{g_z D_x - g_x D_z}{(2g_z + D_z)(D_x + D_z)}\right) \frac{dx}{x} \\ &= \frac{D_x D_z + 2g_z D_z + D_z D_z + g_z D_x + g_x D_z}{(2g_z + D_z)(D_x + D_z)} \frac{dx}{x} \end{aligned}$$

Thus, irrespectively of whether assumption 1 holds or not, wages always increase with c :

$$\frac{dw}{dc} \geq 0$$

QED

A.2.2 GDP increases with globalization

$$Y = 2x\theta^2 = 2w\theta$$

$$\frac{dY}{Y} = \frac{dw}{w} + \frac{d\theta}{\theta} = \frac{dx}{x} + 2\frac{d\theta}{\theta}$$

$$\begin{aligned} \frac{dY}{Y} &= \frac{dx}{x} - \frac{2g_z D_x - 2g_x D_z}{(2g_z + D_z)(D_x + D_z)} \frac{dx}{x} \\ &= \left(1 - \frac{2g_z D_x - 2g_x D_z}{(2g_z + D_z)(D_x + D_z)}\right) \frac{dx}{x} \\ &= \frac{2g_z D_z + D_x D_z + D_z D_z + 2g_x D_z}{(2g_z + D_z)(D_x + D_z)} \frac{dx}{x} \end{aligned}$$

Thus, irrespectively on whether assumption 1 holds or not, income always increases with c :

$$\frac{dY}{dc} > 0$$

QED

A.3 Proof of Result 14

Consider again the two functions defined in the proof of Result 13 (section A.2):

$$g(x) = g_x \equiv x f(x),$$

$$D(x) = D_x \equiv \int_x^1 \frac{a}{x} dF(a),$$

Recall that both $g(x)$ and $D(x)$ are non negative and that $D(x)$ is decreasing:

$$dD(x) = -(g_x + D_x) \frac{dx}{x}$$

Additionally, notice that assumption 1 implies that $g_z > g_x$.

Then:

$$\theta = (D_x + D_z)$$

$$d\theta = - \left[(g_x + D_x) \frac{dx}{x} + (g_z + D_z) \frac{dz}{z} \right]$$

Which after some algebra results in:

$$d\theta = - \frac{g_z D_x - g_x D_z}{(2g_z + D_z)} \frac{dx}{x}$$

Thus, as x increases with c , given that $D_x > D_z$ and that assumption 1 guarantees that $g_z > g_x$:

$$\frac{d\theta}{dc} < 0$$

The fact that the number of entrepreneurs operating in the market increases follows from noticing that the labor market equilibrium implies:

$$1 = [1 - F(x) + 1 - F(z)] + \theta$$

Thus, if θ decreases, $[1 - F(x) + 1 - F(z)]$ must increase.

QED

A.4 Proof of Result 15

Recall that $\phi = \frac{w}{z} = c\theta$. Then,

$$\frac{d\phi}{\phi} = \frac{dw}{w} - \frac{dz}{z} = \frac{2g_x D_x + 3g_x D_z + g_z D_x + 2g_z D_z + D_x D_x + 2D_x D_z + D_z D_z}{(2g_z + D_z)(D_x + D_z)} \frac{dx}{x}$$

Multiplying both sides by $\phi = c\theta = c(D_x + D_z)$, we get:

$$d\phi = \frac{c}{x} \frac{2g_x D_x + 3g_x D_z + g_z D_x + 2g_z D_z + D_x D_x + 2D_x D_z + D_z D_z}{(2g_z + D_z)} dx$$

$$ad\phi = \frac{a}{z} \frac{2g_x D_x + 3g_x D_z + g_z D_x + 2g_z D_z + D_x D_x + 2D_x D_z + D_z D_z}{(2g_z + D_z)} dx$$

$$ad\phi - dw = \frac{a}{z} \frac{2g_x D_x + 3g_x D_z + g_z D_x + 2g_z D_z + D_x D_x + 2D_x D_z + D_z D_z}{(2g_z + D_z)} dx$$

$$- \frac{g_x D_z + g_z D_x + 2g_z D_z + D_x D_z + D_z D_z}{(2g_z + D_z)} dx$$

$$= \left(\frac{a}{z} - 1 \right) \frac{g_x D_z + g_z D_x + 2g_z D_z + D_x D_z + D_z D_z}{(2g_z + D_z)} dx$$

$$+ \frac{a}{z} \frac{2g_x D_x + 2g_x D_z + D_x D_x + D_x D_z}{(2g_z + D_z)} dx$$

Thus it is clear that for those who have foreign subsidiaries the profits of those subsidiaries increase:

$$\text{if } a > z \implies \frac{d(a\phi - w)}{dc} > 0$$

QED

A.5 Value functions as a function of c

As the wage rate is increasing in c , it is clear that individuals which always choose to be workers prefer to live in the economy with the highest value of c . Result 25 establishes who these individuals are.

Result 25 *Individuals with talent $a \leq X^A$ always choose to be workers. Their value function is*

$$a \leq X^A \quad \Rightarrow \quad V(c|a \leq X^A) = W_w(c) \quad \forall c \quad (49)$$

Figure 6 shows the value function of the individuals with a low level of a as a function of c . The more similar the economies, the better they are, as they are never going to be entrepreneurs, and more openness implies higher labor demand and higher wages. Figure 6(a) depicts the wage $w(c)$ together with the values of $\theta(c)$ and $\phi(c)$, showing that for any value of c these agents prefer to be workers. In figure 6(b) the bold line marks the best choice (being a worker) out of the three available options (w if workers, $a\theta$ if local entrepreneurs and $a\theta + a\phi - w$ if foreign entrepreneurs).

Let us now consider agents with an intermediate level of talent, i.e. talent between X^A and X^I . Those individuals choose to be domestic entrepreneur only if a low level globalization shelters them from foreign competition. If foreign competition increases, because of higher globalization, they prefer to become workers.

Result 26 *Individuals with talent $a \in [X^A, X^I]$ are workers if $c \leq x^{-1}(a)$ and domestic entrepreneurs (not investing abroad) otherwise. Their value is:*

$$X^A \leq a \leq X^I \quad \Rightarrow \quad V(a|c) = \begin{cases} W_d(c|a) & c \leq x^{-1}(a) \\ W_w(c) & x^{-1}(a) \leq c \end{cases} \quad (50)$$

Figure 7 shows the value function of the individuals with talent between X^A and X^I as a function of c . They choose to be domestic entrepreneurs only if there is enough protection from foreign competition that allows to enjoy low wages, i.e. if $c \leq x^{-1}(a)$. As the entrepreneurial environments become more similar both the income as entrepreneur decreases (see result 14) and the outside option of being a worker becomes more attractive. Once c is such that $a = x(c)$, they are indifferent between the two options. For higher levels of globalization they prefer to be workers, and their income increases with c .⁴¹ Thus, their value function is U-shaped. Figure 7(a) shows the value of $a\theta(c)$ and $w(c)$. Figure 7(b) marks the best option available.⁴²

We finally consider the individuals with the highest level of talent, i.e. talent between X^I and 1. Those individuals always choose to become domestic entrepreneurs and operate also abroad if the degree of globalization is large enough.

Result 27 *Individuals with talent $a \in [X^I, 1]$ are always entrepreneurs. They operate abroad if and only if $c \geq z^{-1}(a)$.*

$$X^I \leq a \leq 1 \quad \Rightarrow \quad V(a|c) = \begin{cases} V_d(c) & c \leq z^{-1}(a) \\ V_f(c|a) & z^{-1}(a) \leq c \end{cases} \quad (51)$$

Figure 8 shows the value function of the individuals with $X^I \leq a \leq 1$ as a function of c . By definition they are always better off as entrepreneurs than as workers, as in the lowest possible value for a domestic entrepreneur and the highest possible value for a worker (with $c = 1$) they would get $a \frac{w^I}{X^I} \geq w^I$. Only

⁴¹They never consider the possibility of investing abroad, as the value of investing abroad ($a\phi(c) \leq a\theta(c)$) is always lower than the available alternatives.

⁴²Notice that the individuals with talent $a = X^I$ are indifferent between being workers or entrepreneurs at $c = 1$. If entrepreneurs, they are also indifferent between investing abroad or not.

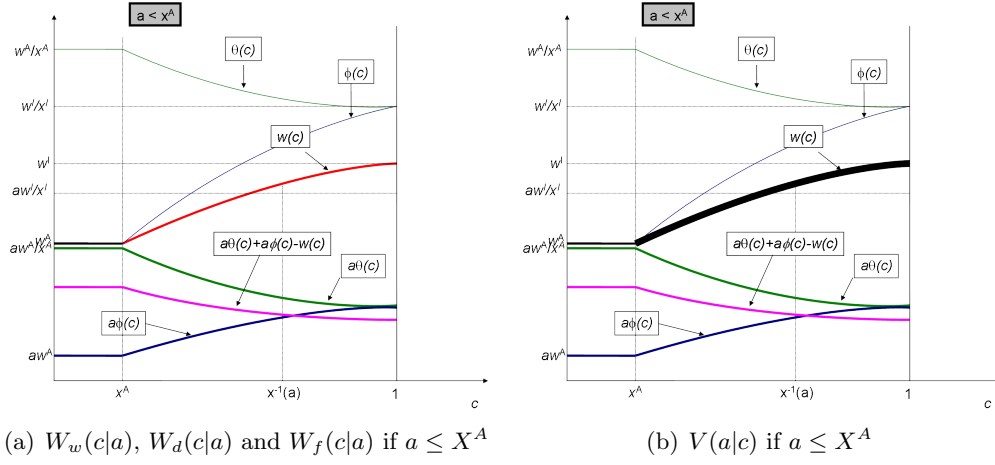


Figure 6: Value of an individual with very low level of talent, who never chooses to be an entrepreneur even in a closed economy

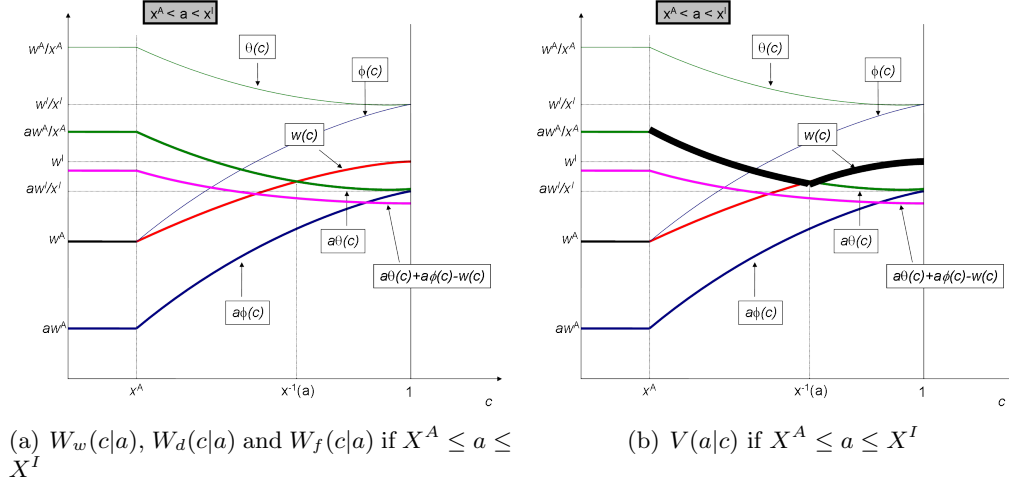


Figure 7: Value of an individual with an intermediate level of talent, who is an entrepreneur only if there is enough protection from foreign competition.

if the economy is sufficiently integrated they choose to operate abroad. Observe that the profits from a foreign subsidiary increases with c and it is negative at $c = X^A$ insofar $a < 1$. Thus, by continuity, there must exist a value of $c < 1$ such that foreign profits are zero, because at $c = 1$ they are necessarily positive, as foreign and domestic subsidiaries produce the same gross profits. The value function is U-shaped as the increase in c produces an increase in the profits of the foreign subsidiary larger than the decrease in the domestic one (under the condition of result 28). Figure 8(a) shows the value of the different options, and figure 8(b) marks the best option available.

A.6 Uniform distribution of talent

Result 28 Assume that talent is uniformly distributed. For agents who have a foreign subsidiary, a marginal increase in c increases the net profit of foreign subsidiaries more than it decreases the profit of

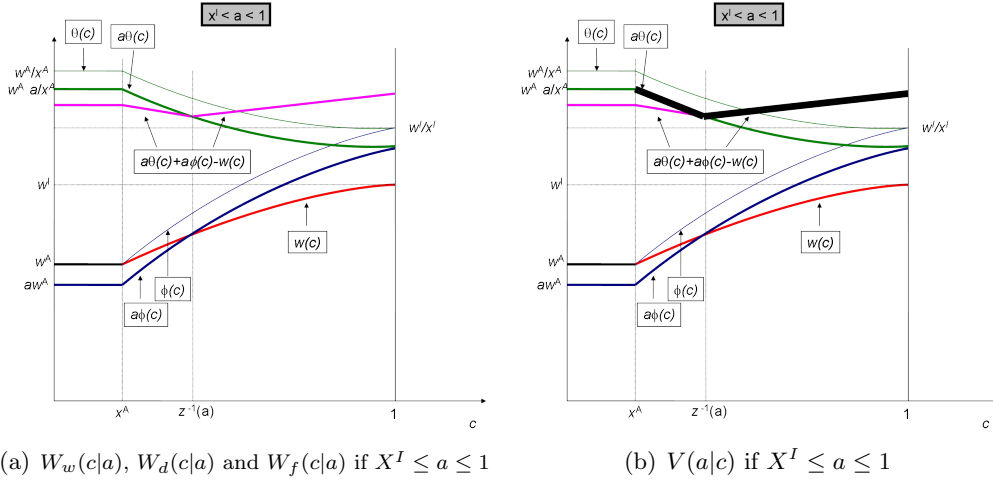


Figure 8: Value of an individual with a high level of talent, who engages in FDI if the degree of globalization is large enough.

the local one:

$$\text{If } a \geq z(c) \Rightarrow \frac{d(W_d(c|a) + W_f(c|a))}{dc} = \frac{\beta}{1-\beta} \left[a \left(\frac{d\theta(c)}{dc} + \frac{d\phi(c)}{dc} \right) - \frac{dw(c)}{dc} \right] \geq 0 \quad (52)$$

Let us rewrite the value of foreign entrepreneurs:

$$\begin{aligned} V_f(c | a > z) &= w(c) \left[a \left(\frac{1}{x(c)} + \frac{1}{z(c)} \right) - 1 \right] \\ &= \frac{aw(c)}{x(c)} + \frac{aw(c)}{x(c)} c - w(c) \\ &= a\theta(c) + a\phi(c) - w(c) \end{aligned}$$

From result 14 we know that:

$$ad\theta(c) = -a \frac{g_z D_x - g_x D_z}{2g_z + D_z} \frac{dx}{x} < 0$$

From result 15 we know that

$$\begin{aligned} ad\phi(c) - dw(c) &= \left(\frac{a}{z} - 1 \right) \frac{g_x D_z + g_z D_x + 2g_z D_z + D_x D_z + D_z D_z}{2g_z + D_z} dx + \\ &+ \frac{a}{z} \frac{2g_x D_x + 2g_x D_z + D_x D_x + D_x D_z}{2g_z + D_z} dx \end{aligned}$$

Therefore

$$dV_f(c | a > z) = ad\theta(c) + ad\phi(c) - dw(c)$$

$$\begin{aligned} ad\theta(c) + ad\phi(c) - dw(c) &= \left(\frac{a}{z} - 1 \right) \frac{g_x D_z + g_z D_x + 2g_z D_z + D_x D_z + D_z D_z}{2g_z + D_z} dx + \\ &+ \frac{a}{z} \frac{2g_x D_x + 2g_x D_z + D_x D_x + D_x D_z}{2g_z + D_z} dx - \frac{a}{x} \frac{g_z D_x - g_x D_z}{2g_z + D_z} dx \end{aligned}$$

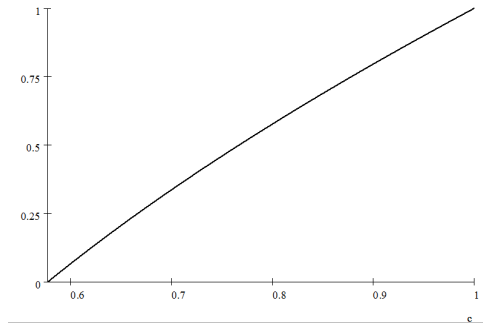


Figure 9: Condition 53 as a function of c assuming a uniform distribution of talent

As the first term is positive for any $a > z$, let us concentrate on the last two terms:

$$\begin{aligned}
& \frac{a}{z} \frac{2g_x D_x + 2g_x D_z + D_x D_x + D_x D_z}{2g_z + D_z} dx - \frac{a}{zc} \frac{g_z D_x - g_x D_z}{2g_z + D_z} dx \\
&= \frac{a}{z} \frac{c2g_x D_x + c2g_x D_z + cD_x D_x + cD_x D_z - g_z D_x + g_x D_z}{c(2g_z + D_z)} dx \\
&= \frac{a}{z} \frac{D_x (2cg_x - g_z + cD_x + cD_z) + c2g_x D_z + g_x D_z}{c(2g_z + D_z)} dx
\end{aligned}$$

A sufficient condition for the above expression to be positive is that $(2cg_x - g_z + cD_x + cD_z) \geq 0$:

$$\begin{aligned}
(2cg_x - g_z + cD_x + cD_z) &= 2xc f(x) - z f(z) + c \int_x^1 \frac{a}{x} dF(a) + c \int_z^1 \frac{a}{z} dF(a) \\
&= 2xc f(x) - z f(z) + \int_x^1 \frac{a}{z} dF(a) + c \int_z^1 \frac{a}{z} dF(a) \\
&= \frac{1}{z} \left(2x^2 f(x) - z^2 f(z) + \int_x^1 a dF(a) + c \int_z^1 a dF(a) \right) \geq 0
\end{aligned}$$

The above condition is always satisfied if talent is uniformly distributed:

$$\begin{aligned}
2x^2 f(x) - z^2 f(z) + \int_x^1 a dF(a) + c \int_z^1 a dF(a) &= 2x^2 - z^2 + \frac{1}{2} [1 - x^2] + c \frac{1}{2} [1 - z^2] \\
&= \frac{3}{2} x^2 - z^2 \left(1 + \frac{c}{2} \right) + \frac{1}{2} (1 + c) \geq 0 \quad (53)
\end{aligned}$$

It is straightforward to check that with a uniform distribution one obtains:

$$\begin{aligned}
X_A &= \sqrt{\frac{1}{3}} \\
z(c) &= \frac{c + \sqrt{c^2 + 3c(1+c)^2}}{3c(1+c)}
\end{aligned}$$

Recalling that $x(c) = z(c) \times c$ condition (53) reads as follows:

$$\frac{3}{2} \left(\frac{c + \sqrt{c^2 + 3c(1+c)^2}}{3(1+c)} \right)^2 - \left(\frac{c + \sqrt{c^2 + 3c(1+c)^2}}{3c(1+c)} \right)^2 \left(1 + \frac{c}{2} \right) + \frac{1}{2} (1 + c) \geq 0$$

The above inequality is always positive for $c > X_A = \sqrt{\frac{1}{3}}$ as shown in figure 9.

QED